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Space Administration
Langley Research Center

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WHAT'S INSIDE

NASA STI Program ... in Profile

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The U.S. Patent and Trademark Office provides online access to full text patents and patent applications. The database includes patents back to 1976 plus some pre-1975 patents. Visit the USPTO at http://www.uspto.gov/patft/.

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Mathematical and Computer Sciences

Physics

Social and Information Sciences

Space Sciences

Indexes

Two indexes are available. You may use the find command under the tools menu while viewing the PDF file for direct match searching on any text string. You may also select either of the two indexes provided for linking to the corresponding document citation from *NASA Thesaurus* terms and personal author names.

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS

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VOLUME 46, NUMBER 22 NOVEMBER 10, 2008

01
AERONAUTICS (GENERAL)

Includes general research topics related to manned and unmanned aircraft and the problems of flight within the Earth's atmosphere. Also includes manufacturing, maintenance, and repair of aircraft. For specific topics in aeronautics, see categories 02 through 09. For information related to space vehicles see 12 Astronautics.

20080042146 Andersen (Gerald), Torrance, CA, USA
Deformation-Control System and Method
Cowan, D. L., Inventor; Tidwell, J. Z., Inventor; 7 Dec 04; 11 pp.; In English
Contract(s)/Grant(s): F33615-02-C-3257
Patent Info.: Filed Filed 7 Dec 04; US-Patent-Appl-SN-11-007 733
Report No.(s): PB2008-104528; No Copyright; Avail.: CASI: A03, Hardcopy

A system for selectively controlling deformation. The system includes a first mechanism for resisting deformation about an axis of an accompanying fluid foil. A second mechanism, in communication with the first mechanism, enables deformation along the axis and/or at an angle to the axis. In more a specific embodiment, the axis is a lengthwise axis of the fluid foil, which is a transformable airfoil, and the system includes a bellows device that is approximately concentric with the axis. The bellows device is supported by first base structure at one end and a second base structure at another end. The deformation at an angle to the first axis includes shear deformation or bending deformation. The deformation along the axis includes extension or strain deformation. The deformation about the axis includes torsion deformation.
NTIS
Airfoils; Deformation; Patent Applications

20080042148 Andersen (Gerald), Torrance, CA, USA
Tranformable Fluid Foil with Pivoting Spars
Jha, A. K., Inventor; Cowen, D. L., Inventor; 7 Dec 04; 12 pp.; In English
Contract(s)/Grant(s): F33615-002-C-3257
Patent Info.: Filed Filed 7 Dec 04; US-Patent-Appl-SN-11-007 726
Report No.(s): PB2008-104525; No Copyright; Avail.: CASI: A03, Hardcopy

The invention is an adjustable fluid foil. The fluid foil includes a foil support structure having one more spars. A first mechanism facilitates mounting the one or more spars to one or more supports. The one or more spars are independently controllable and form a frame that is covered with a deformable skin. A second mechanism provides a control signal, and a third mechanism selectively rotates the first mechanism based on the control signal, thereby reorienting the one or more spars and implementing desired changes in fluid foil characteristics. In a specific embodiment, the spars are telescoping spars that are responsive to control signals from the second mechanism, and the spars exhibit strategically different shapes to facilitate wing camber adjustments in response to reorientation of the one or more spars.
NTIS
Airfoils; Patent Applications

02
AERODYNAMICS

Includes aerodynamics of flight vehicles, test bodies, airframe components and combinations, wings, and control surfaces. Also includes aerodynamics of rotors, stators, fans, and other elements of turbomachinery. For related information see also 34 Fluid Mechanics and Thermodynamics.

20080040839 National Transportation Safety Board, Washington, DC USA
Runway Overrun and Collision, Southwest Airlines Flight 1248, Boeing 737-7H4, N471WN, Chicago Midway International Airport, Chicago, Illinois, December 8, 2005
Oct. 02, 2007; 248 pp.; In English
Report No.(s): PB2007-910407; NTSB/AAR-07/06; No Copyright; Avail.: CASI: A11, Hardcopy

This report explains the accident involving a Boeing 737-7H4, N471WN, operated by Southwest Airlines (SWA), which departed the end of runway 31C after landing at Chicago Midway International Airport. The safety issues discussed in this report include the flight crews decisions and actions, the clarity of assumptions used in onboard performance computers, SWA policies, guidance, and training, arrival landing distance assessments and safety margins, runway surface condition assessments and braking action reports, airplane-based friction measurements, and runway safety areas. Safety recommendations concerning these issues are addressed to the Federal Aviation Administration.
NTIS
Accident Investigation; Airline Operations; Airports; Boeing 737 Aircraft; Civil Aviation; Collisions; Commercial Aircraft; Cost Analysis; Runways

20080041121 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Velocity Estimate Following Air Data System Failure
McLaren, Scott A; Mar 2008; 307 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483268; AFIT/GAE/ENY/08-M21; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483268

The purpose of this research was to investigate a method of determining an aircraft's airspeed in the event of total air data system failure. The process combined GPS-aided inertial velocity with a continuously estimated wind velocity. A velocity estimator (VEST) algorithm was developed to combine the inertial and wind velocities to provide an estimate of the aircraft's current true velocity to be used for command path gain scheduling and for display in the cockpit. The effort resulted in a flight test program as part of a Test Management Project at the USA Air Force Test Pilot School. The project consisted of two ground test and six flight test evaluation sorties. The average true airspeed error from the estimator algorithm during inflight maneuvers was determined to be 12 knots, nondivergent, and minimally variable. The results of this research clearly showed the potential of the algorithm to determine an aircraft's airspeed in the event of an air data system failure. Recommendations for future research and improvements to the operation of the velocity estimator algorithm are discussed.
DTIC
Air Data Systems; Airspeed; Algorithms; Estimates; Flight Control; Scheduling; System Failures; Wind Velocity

20080041533 NASA Glenn Research Center, Cleveland, OH, USA
Implementation and Validation of a Laminar-to-Turbulent Transition Model in the Wind-US Code
Denissen, Nicholas A.; Yoder, Dennis A.; Georgiadis, Nicholas J.; September 2008; 36 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 659877.02.08.0654.01; WBS 599489.02.07.03.03.02.01
Report No.(s): NASA/TM-2008-215451; E-16671; Copyright; Avail.: CASI: A03, Hardcopy

A bypass transition model has been implemented in the Wind-US Reynolds Averaged Navier-Stokes (RANS) solver. The model is based on the Shear Stress Transport (SST) turbulence model and was built starting from a previous SST-based transition model. Several modifications were made to enable (1) consistent solutions regardless of flow field initialization procedure and (2) fully turbulent flow beyond the transition region. This model is intended for flows where bypass transition, in which the transition process is dominated by large freestream disturbances, is the key transition mechanism as opposed to transition dictated by modal growth. Validation of the new transition model is performed for flows ranging from incompressible to hypersonic conditions.
Author
Flow Distribution; Turbulent Flow; Stress Analysis; Reynolds Averaging; Bypasses; Free Flow; Shear Stress

20080042274 NASA Langley Research Center, Hampton, VA, USA

Adjoint-Based Methodology for Time-Dependent Optimization

Yamaleev, N. K.; Diskin, B.; Nielsen, E. J.; September 10, 2008; 10 pp.; In English; 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, 10-12 Sep. 2008, Victoria, Canada; Original contains black and white illustrations

Contract(s)/Grant(s): WBS 984754.02.07.07.14.03; Copyright; Avail.: CASI: A02, Hardcopy

This paper presents a discrete adjoint method for a broad class of time-dependent optimization problems. The time-dependent adjoint equations are derived in terms of the discrete residual of an arbitrary finite volume scheme which approximates unsteady conservation law equations. Although only the 2-D unsteady Euler equations are considered in the present analysis, this time-dependent adjoint method is applicable to the 3-D unsteady Reynolds-averaged Navier-Stokes equations with minor modifications. The discrete adjoint operators involving the derivatives of the discrete residual and the cost functional with respect to the flow variables are computed using a complex-variable approach, which provides discrete consistency and drastically reduces the implementation and debugging cycle. The implementation of the time-dependent adjoint method is validated by comparing the sensitivity derivative with that obtained by forward mode differentiation. Our numerical results show that O(10) optimization iterations of the steepest descent method are needed to reduce the objective functional by 3-6 orders of magnitude for test problems considered.

Author

Discrete Functions; Adjoints; Time Dependence; Design Optimization; Unsteady Flow; Two Dimensional Flow; Finite Volume Method; Computational Fluid Dynamics

03
AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; airport ground operations; flight safety and hazards; and aircraft accidents. Systems and hardware specific to ground operations of aircraft and to airport construction are covered in 09 Research and Support Facilities (Air). Air traffic control is covered in 04 Aircraft Communications and Navigation. For related information see also 16 Space Transportation and Safety and 85 Technology Utilization and Surface Transportation.

20080041122 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Forecasting Flying Hour Costs of the B-1, B-2, and the B-52 Bomber Aircraft

Van Dyk, Stefanie L; Mar 2008; 105 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483271; AFIT/GCA/ENV/08-M02; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483271

This thesis both evaluates, and presents improvements to, the current method of forecasting flying costs of Air Force aircraft. It uses depot level repairable (DLR) and consumable (CONS) data for the Air Force's bomber platforms: B-1B, B-2, and B-52H. The current forecasting method assumes a proportional relationship between costs and flying hours such that 1) when no hours are flown costs are zero, and 2) a 1% increase in flying hours will increase costs by 1%. The findings of this research indicate that applying log-linear ordinary least squares regression techniques may be an improved fit of flying cost data over the current proportional model; the actual data indicate a non-zero intercept and a less than proportional relationship between costs and flying hours. This research also found that models including factors other than flying hours as independent variables, such as sorties, lagged costs, and fiscal trends, may be more useful than models based solely on flying hours. Finally, this research found that estimating quarterly costs at the base-level may yield more accurate estimates than estimating at the monthly level, or mission design series level.

DTIC

B-1 Aircraft; B-2 Aircraft; B-52 Aircraft; Bomber Aircraft; Cost Analysis; Costs; Forecasting

20080041292 Naval Postgraduate School, Monterey, CA USA

The Use of the Analytical Hierarchy Process as a Source Selection Methodology and Its Potential Application within the Hellenic Air Force

Tsagdis, Angelis; Jun 2008; 99 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483574; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This thesis assesses the feasibility of using the Analytical Hierarchy Process (AHP) as a dynamic tool for decision-making in defense acquisition. The gradual reductions in defense budgets, the need for efficient allocation of funds among competitive activities, the demand from public opinion for rationality, transparency and efficiency in defense spending, the complicated

legislation concerning procurements, all call for changes in the way officials make decisions. The AHP is a multiattribute decision-making technique, developed by Thomas Saaty to support users with complex decision-making by combining their experience, judgment, and intuition with a view to selecting the best course of action from a number of alternatives. Literature suggests that the AHP is suitable for a wide variety of applications in economics, finance, politics, games and sports, conflict resolution, cost/benefit analyses, resource allocation, source selection, and resolution of everyday problems. This study focuses on the potential use of the AHP for combat aircraft source selection by the Hellenic Air Force, analyzing legislative, acquisition and technical issues relating to this procurement. It concludes that AHP is a suitable decision making tool for defense acquisitions and recommends the Hellenic Air Force evaluate its potential usefulness via a series of pilot acquisition programs.
DTIC
Decision Making; Hierarchies; Selection

20080041298 Naval Postgraduate School, Monterey, CA USA
Simulation of Flight Operations and Pilot Duties in LANTIRN Fighter Squadrons Using Simkit
Azimetli, Mustafa; Jun 2008; 107 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483592; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The LANTIRN (Low-Altitude Navigation and Targeting Infra-Red for Night) introduces important around-the-clock strike capability to air forces. At the same time it strains pilot manpower requirements. The Turkish Air Force asked for a simulation tool that would find the necessary number of pilots and their qualifications for LANTIRN squadrons under different operations scenarios. This thesis develops a simulation that satisfies this request. The simulation takes the pilot ground duties as well as flight operations into account. The weather model inside the simulation introduces the effects of weather conditions around airfield. The model was implemented in the Java language using the Simkit library for the discrete event simulation. The user interacts with a Graphical Use Interface (GUI) to define the parameters experiment input factors and sizes. The output is a data table with required pilot number and qualifications Because access to certain classified data is not possible the thesis sets a general guideline for future analyses that would have the actual data. This study uses notional but realistic values for the parameters and input factor levels Using the resulting output table future analysts can expand and tailor the levels of analyses.
DTIC
Flight Operations; Flight Simulation; Flight Training; Pilots; Simulation

20080041516 NASA Langley Research Center, Hampton, VA, USA
Performance Basis for Airborne Separation
Wing, David J.; September 14, 2008; 12 pp.; In English; 26th Congress of International Council of the Aeronautical Sciences (ICAS 2008), 14-10 Sep. 2008, Anchorage, AK, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 411931.02.21.07.01.03; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041516

Emerging applications of Airborne Separation Assistance System (ASAS) technologies make possible new and powerful methods in Air Traffic Management (ATM) that may significantly improve the system-level performance of operations in the future ATM system. These applications typically involve the aircraft managing certain components of its Four Dimensional (4D) trajectory within the degrees of freedom defined by a set of operational constraints negotiated with the Air Navigation Service Provider. It is hypothesized that reliable individual performance by many aircraft will translate into higher total system-level performance. To actually realize this improvement, the new capabilities must be attracted to high demand and complexity regions where high ATM performance is critical. Operational approval for use in such environments will require participating aircraft to be certified to rigorous and appropriate performance standards. Currently, no formal basis exists for defining these standards. This paper provides a context for defining the performance basis for 4D-ASAS operations. The trajectory constraints to be met by the aircraft are defined, categorized, and assessed for performance requirements. A proposed extension of the existing Required Navigation Performance (RNP) construct into a dynamic standard (Dynamic RNP) is outlined. Sample data is presented from an ongoing high-fidelity batch simulation series that is characterizing the performance of an advanced 4D-ASAS application. Data of this type will contribute to the evaluation and validation of the proposed performance basis.
Author
Air Traffic Control; Trajectories; Air Transportation; Flight Safety; Flight Management Systems

20080041518 NASA Glenn Research Center, Cleveland, OH, USA

Comparison of LEWICE and GlennICE in the SLD Regime

Wright, William B.; Potapczuk, Mark G.; Levinson, Laurie H.; September 2008; 31 pp.; In English; 46th AIAA Aerospace Sciences Meeting and Exhibit, 7-10 Jan. 2008, Reno, NV, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 457280.02.07.03.02

Report No.(s): NASA/TM--2008-215174; AIAA Paper 2008-0439; E-16417; Copyright; Avail.: CASI: A03, Hardcopy

A research project is underway at the NASA Glenn Research Center (GRC) to produce computer software that can accurately predict ice growth under any meteorological conditions for any aircraft surface. This report will present results from two different computer programs. The first program, LEWICE version 3.2.2, has been reported on previously. The second program is GlennICE version 0.1. An extensive comparison of the results in a quantifiable manner against the database of ice shapes that have been generated in the GRC Icing Research Tunnel (IRT) has also been performed, including additional data taken to extend the database in the Super-cooled Large Drop (SLD) regime. This paper will show the differences in ice shape between LEWICE 3.2.2, GlennICE, and experimental data. This report will also provide a description of both programs. Comparisons are then made to recent additions to the SLD database and selected previous cases. Quantitative comparisons are shown for horn height, horn angle, icing limit, area, and leading edge thickness. The results show that the predicted results for both programs are within the accuracy limits of the experimental data for the majority of cases.

Author

Ice Formation; Computer Programs; Leading Edges; Accuracy

20080041541 Civil Aerospace Medical Inst., Oklahoma City, OK, USA

Designing Questionnaires for Controlling and Managing Information Complexity in Visual Displays

Xing, Jing; August 2008; 23 pp.; In English

Contract(s)/Grant(s): AM-HRRD522

Report No.(s): DOT/FAA/AM-08/18; No Copyright; Avail.: CASI: A03, Hardcopy

Information complexity of automation displays has become a bottleneck that limits the usefulness of new technologies in air traffic control (ATC). Previously, we developed a set of metrics to measure information complexity in ATC displays. While these metrics provide measures of display complexity, their use is somewhat limited due to required human factors expertise and understanding of the display design. Technology developers and human factors practitioners often desire quick, easy-to-use tools to assess the display during design and acquisition evaluation. Questionnaires provide a quick and inexpensive means to gather data from a potentially large number of respondents. We developed two questionnaires to evaluate ATC display complexity, based on the metric indices. The first questionnaire employs a multiple-choice format and allows quantitative evaluation of complexity. The second questionnaire uses a Likert rating format and is intended for qualitative assessment of complexity. We conducted an initial assessment of the questionnaires with seven subject matter experts on a radar display (STARS). The results indicate that both questionnaires produced consistent complexity evaluations among the subjects. Thus, we recommend that the multiple-choice questionnaire is more suitable for assessing quantitative complexity control during acquisition evaluations, and the Likert rating questionnaire is more suitable for complexity management during design of new ATC technologies.

Author

Air Traffic Control; Display Devices; Complexity; Human-Computer Interface

20080041542 Civil Aerospace Medical Inst., Oklahoma City, OK, USA

U.S. Airline Transport Pilot International Flight Language Experiences, Report 1: Background Information and General/Pre-Flight Preparation

Prinzo, O. Veronika; Campbell, Alan; September 2008; 68 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): AM-B-06-HRR-516

Report No.(s): DOT/FAA/AM-08/19; Copyright; Avail.: CASI: A04, Hardcopy

In 1998, the International Civil Aviation Organization (ICAO) took a heightened interest in the role of language in airline accidents. Its Air Navigation Commission was directed to complete the task of strengthening relevant ICAO provisions concerning language requirements. Member states agreed to take steps to ensure air traffic control (ATC) personnel and flight crews involved in flight operations in airspace where the use of the English language is required were proficient in conducting and comprehending radiotelephony communications in English. Since then, ICAO developed its English Language Proficiency (ELP) requirements and urged its Members to document their ELP test implementation plans by March 8,2008. Until all ATC personnel and flight crews involved in flight operations obtain a passing level of ELP, the language-based problems international pilots face is not known. This report is a compilation of written responses and comments by a small

focus group of 48 U.S. pilots of their difficulties in international operations. The focus group consisted of 12 international U.S. pilots from American, Continental, Delta, and United Airlines. Each focus group met with two interviewers to discuss their language experiences flying into countries where English may or may not be the local or national language among its radio operators, controllers, and pilots. In this report, the pilots' responses to 23 of the 64 multi-part questions and their comments from discussions of those questions with interviewers are presented as a compiled narrative. The pilots' responses had six major thrusts: (1) Cultural differences exert an important, nearly undetectable influence on international aviation; (2) English language proficiency is deficient and hampers effective communication; (3) Party-line (single-frequency) communications in English facilitate situational awareness. When mixed languages are on frequency, party-line communications pose a safety concern and impede situational awareness; (4) Pronunciation and naming conventions for locations and other identifiers lack a uniform pronunciation, and 3- or 5-letter identifiers may not be connected with the pronunciation; (5) There is no uniform agreement as to what standard phraseology is or should be; and (6) Technological advancements such as datalink may help solve some of the language problems.
Author
Aircraft Pilots; Civil Aviation; Aircraft Accidents; Words (Language); Errors; Air Traffic Controllers (Personnel); English Language; Standardization

20080041882 Naval War Coll., Newport, RI USA
Airpower and the Establishment of Sea Control in an Anti-Access Environment
Bosone, John W; Apr 23, 2008; 26 pp.; In English
Report No.(s): AD-A484319; No Copyright; Avail.: Defense Technical Information Center (DTIC)
The Taiwan Straits issue is a point of strategic, operational, and tactical priority for the U.S. Armed Forces. The 1979 Taiwan Relations Act expresses U.S. interests in the Western Pacific, stating that the USA would view attempts 'to determine the future of Taiwan by other than peaceful means, including by boycotts or embargoes, a threat to the peace and security of the Western Pacific area and of grave concern to the USA.' Due to the PRC's ongoing modernization and development of asymmetric weapons, any future U.S. military engagement with the PRC in support of Taiwan may incur significant operational risk. Thus, the qualities of land-based airpower must be leveraged to establish sea control in anti-access environments such as the Taiwan Straits in order to meet operational objectives. USAF assets provide the Joint Forces Commander and Joint Forces Maritime Component Commander critical operational capabilities to enhance maritime freedom of action. To provide a background, four cases, starting with the sinking of the Ostfriesland in 1921, spanning action in the Atlantic and Pacific during World War II, and ending with the Falkland Islands conflict in 1982, illustrate land-based airpower's ability to affect maritime freedom of action. Joint doctrine and Service doctrine prescribe how land- based airpower will and should be employed in support of maritime operational objectives. Additionally, USAF Countersea doctrine details how the JFACC could support the JFMCC at the operational level of war. Land-based airpower employed jointly with organic naval airpower can have a synergistic effect toward accomplishment of maritime objectives and reduce the risk to the force through persistent ISR, C2, AAR and stealth.
DTIC
Military Operations; Seas

20080041889 Naval War Coll., Newport, RI USA
What Happens when the Lights Go Out: Airpower Vulnerabilities in the Era of Network Centric Warfare
Culp, Matthew D; Mar 23, 2008; 29 pp.; In English
Report No.(s): AD-A484336; No Copyright; Avail.: Defense Technical Information Center (DTIC)
Technological superiority has played an important role in the dominance of US airpower, but the organization of the command and control structure has also been crucial. For years, the 'master tenet' of airpower has been centralized control with decentralized execution. But a combination of factors including technology, collateral damage concerns, and dynamic targeting requirements have caused execution authority to become increasingly centralized in recent operations. This trend has resulted in a growing tendency for operational commanders, such as the Join Force Air Combatant Commander (JFACC), to direct action at the tactical level. In the era of Network-Centric Warfare, command and control (C2) organizations increasingly depend on complex communications systems and networks DOD infrastructure has not kept pace with rapidly growing bandwidth requirements, leading to a heavy reliance on more vulnerable commercial systems. As a result, C2 organizations are becoming more vulnerable to physical, electronic, and cyber attacks, and the complexity of communications networks makes it impossible to predict the consequences of a multi-faceted attack.
DTIC
Command and Control; Luminaires; Vulnerability; Warfare

20080042032 Arizona State Univ., East Mesa, AZ USA

The Role of Visual Occlusion in Altitude Maintenance During Simulated Flight

Gray, Rob; Geri, George A; Akhtar, Shama C; Covas, Christine M; Aug 25, 2006; 15 pp.; In English

Contract(s)/Grant(s): FA8650-05-D-6502; Proj-1123

Report No.(s): AD-A483743; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The use of visual occlusion as a cue to altitude maintenance in low-altitude flight (LAF) was investigated. The extent to which the ground surface is occluded by 3-D objects varies with altitude and depends on the height, radius, and density of the objects. Participants attempted to maintain a constant altitude during simulated flight over an undulating terrain with trees of various heights, radii, and densities. As would be predicted if participants used occlusion, root-mean-square error was related to the product of tree height and tree density (Experiment 1) and to the product of tree radius and tree density (Experiment 2). This relationship was also found for simulated terrains with a more realistic mixture of tree heights (Experiment 4). The authors present a modification to an occlusion model (T. Leung & J. Malik, 1997) that can be used to approximate occlusion in the context of LAF, and they evaluate the modified model using the present LAF data. On a practical level, simulating 3-D objects is computationally expensive. The present results suggest that performance may be maintained with fewer objects if their size is increased.

DTIC

Flight Simulation; Low Altitude; Maintenance; Occlusion; Visual Perception

20080042307 NASA Langley Research Center, Hampton, VA, USA

Flying by Ear: Blind Flight with a Music-Based Artificial Horizon

Simpson, Brian D.; Brungart, Douglas S.; Dallman, Ronald C.; Yasky, Richard J., Jr.; Romigh, Griffin; September 22, 2008; 5 pp.; In English; HFES 2008: Human Factors and Ergonomics Society 52nd Annual Meeting, 22-26 Sep. 2008, New York City, NY, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 743368.01.07.03

Report No.(s): Meeting Paper No. 744; Copyright; Avail.: CASI: A01, Hardcopy

Two experiments were conducted in actual flight operations to evaluate an audio artificial horizon display that imposed aircraft attitude information on pilot-selected music. The first experiment examined a pilot's ability to identify, with vision obscured, a change in aircraft roll or pitch, with and without the audio artificial horizon display. The results suggest that the audio horizon display improves the accuracy of attitude identification overall, but differentially affects response time across conditions. In the second experiment, subject pilots performed recoveries from displaced aircraft attitudes using either standard visual instruments, or, with vision obscured, the audio artificial horizon display. The results suggest that subjects were able to maneuver the aircraft to within its safety envelope. Overall, pilots were able to benefit from the display, suggesting that such a display could help to improve overall safety in general aviation.

Author

Aircraft Safety; Pilot Performance; Attitude (Inclination); Audio Signals; Music; Horizon; Navigation Aids

20080042365 Government Accountability Office, Washington, DC, USA

Air Traffic Control: FAA Reports Progress in System Acquisitions, but Changes in Performance Measurement Could Improve Usefulness of Information

Dec. 2007; 38 pp.; In English

Report No.(s): PB2008-105023; GAO-08-42; No Copyright; Avail.: CASI: A03, Hardcopy

Acquiring new systems on budget and on schedule is critically important in transitioning to the Next Generation Air Transportation System (NextGen). However, air traffic control modernization has been on GAO's high-risk list since 1995, in part due to acquisitions exceeding budget and schedule targets. The Federal Aviation Administration's (FAA) Air Traffic Organization (ATO) has responsibility for managing air traffic control acquisitions. GAO was asked to examine (1) ATO's goals, performance measures, and reporting for systems acquisitions; (2) the validity of ATO's performance measures; and (3) the implications of using ATO's performance measures to assess progress in transitioning to NextGen. To address these issues, GAO compared ATO's measures with attributes of successful performance measures, interviewed agency officials, and sought perspectives of aviation experts.

NTIS

Air Traffic; Air Transportation; Management Planning; Progress; Risk Management; Schedules

20080042414 NASA Langley Research Center, Hampton, VA, USA

How Past Loss of Control Accidents May Inform Safety Cases for Advanced Control Systems on Commercial Aircraft

Holloway, C. M.; Johnson, C. W.; October 20, 2008; 6 pp.; In English; 3rd International Conference on System Safety, 20-22 Oct. 2008, Birmingham, UK

Contract(s)/Grant(s): WBS 457280.02.07.07.08; Copyright; Avail.: CASI: A02, Hardcopy

This paper describes five loss of control accidents involving commercial aircraft, and derives from those accidents three principles to consider when developing a potential safety case for an advanced flight control system for commercial aircraft. One, among the foundational evidence needed to support a safety case is the availability to the control system of accurate and timely information about the status and health of relevant systems and components. Two, an essential argument to be sustained in the safety case is that pilots are provided with adequate information about the control system to enable them to understand the capabilities that it provides. Three, another essential argument is that the advanced control system will not perform less safely than a good pilot.

Author

Aircraft Control; Safety Management; Aircraft Accidents; Airline Operations; Commercial Aircraft; Flight Control; Flight Safety; Civil Aviation

04
AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes all modes of communication with and between aircraft; air navigation systems (satellite and ground based); and air traffic control. For related information see also 06 Avionics and Aircraft Instrumentation; 17 Space Communications, Spacecraft Communications, Command and Tracking; and 32 Communications and Radar.

20080041820 Naval Postgraduate School, Monterey, CA USA

Testing and Evaluation of an Integrated GPS/INS System for Small AUV Navigation

Yun, X; Bachmann, E R; McGhee, R B; Whalen, R H; Roberts, R L; Knapp, R G; Healey, A J; Zyda, M J; Jul 1999; 22 pp.; In English

Contract(s)/Grant(s): CDA-9729814; ARPA ORDER-C309/06

Report No.(s): AD-A484176; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A Small AUV Navigation System (SANS) is being developed at the Naval Postgraduate School. The SANS is an integrated GPS/INS navigation system composed of low-cost and small-size components. It is designed to demonstrate the feasibility of using a low-cost strap-down Inertial Measurement Unit (IMU) to navigate between intermittent GPS fixes. The present hardware consists of a GPS/DGPS receiver, IMU, compass, water speed sensor, water depth sensor, and a data processing computer. The software is based on a twelve-state complementary filter that combines measurement data from all sensors to derive a vehicle position/orientation estimate. This paper describes hardware and software design, and testing results of the SANS. It is shown that results from tilt table testing and bench testing provide an effective means for tuning filter gains. Ground vehicles testing verifies the overall functioning of the SANS, and exhibits an encouraging degree of accuracy.

DTIC

Global Positioning System; Inertial Navigation; Navigation; Systems Integration

05
AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes all stages of design of aircraft and aircraft structures and systems. Also includes aircraft testing, performance and evaluation, and aircraft and flight simulation technology. For related information see also 18 Spacecraft Design, Testing and Performance and 39 Structural Mechanics. For land transportation vehicles see 85 Technology Utilization and Surface Transportation.

20080040878 Shimokaji and Associates P.C., Irvine, CA, USA

Installation Tool for Aerospace Fastening System

Jensen, D., Inventor; Pett, D., Inventor; Buehler, P., Inventor; 30 Jan 06; 21 pp.; In English

Contract(s)/Grant(s): F33657-91-C-0006

Patent Info.: Filed Filed 30 Jan 06; US-Patent-Appl-SN-11-344 324

Report No.(s): PB2008-103905; No Copyright; Avail.: CASI: A03, Hardcopy

A system, for installation of fastening systems to a structure, includes a fastening system installation specification, which includes dimensional and qualitative requirements for components of the fastening systems; and a tool. The tool includes an

outer housing having an interior hollow, a gage surface, and a base surface, the base surface having a contact area that contacts the surface of the structure. An inner plug disposed within the interior hollow translates axially within the interior hollow. The inner plug has a sensing end that contacts a bolt of the fastening system and references the shank section of the bolt. The inner plug has an indicator end dimensioned to accept washers and nuts of the fastening system stacked on the gage surface. The inner plug has an indicator that provides installation information, according to either qualitative or dimensional requirements, about the components of the fastening system being installed using the tool.
NTIS
Aerospace Systems; Installing; Patent Applications

20080041112 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
The Effects of Commercial Video Game Playing: A Comparison of Skills and Abilities for the Predator UAV
Triplett, Johnny E; Mar 2008; 100 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483256; AFIT/GIR/ENV/08-M22; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483256

Currently, Predator unmanned aerial vehicles (UAV) are operated by pilots and navigators experienced with manned combat aircraft. With a projected increase in UAVs, more combat pilots will be needed to operate these aircraft. Yet, if the current operational tempo continues, the supply of combat pilots may not be able to meet the demand. Perhaps alternative pools of Air Force personnel could be considered for UAV duty to meet operational requirements. Because the Predator UAV is a software-driven aircraft, video game players (VGPs) already possess and use many skills that may be similar to those of Predator UAV pilots. A variety of games can add situational awareness skills that a player/airman can bring to a new situation. This research examines the applicability of video-games-based skills to the operation of the Predator UAV. Nine people were interviewed to determine the overlap between piloting skills, UAV-specific skills, and skills gained and developed from gaming. The results indicate that frequent VGPs have the confidence and the consistent ability to obtain and retain new skills, many of which are related to operating the Predator UAV in a 2-D environment while not relying on the visual and nonvisual cues of the manned aircraft pilot.
DTIC
Pilotless Aircraft; Predators; Remotely Piloted Vehicles; Transfer of Training

20080041136 Dayton Univ. Research Inst., OH USA
Executive Summary Report of Work Accomplished on the Corrosion-Fatigue Assessment Program
Hoppe, Wally; Braisted, William; Pierce, Jennifer; Abfalter, Garry; Mar 31, 2008; 27 pp.; In English
Contract(s)/Grant(s): N00014-06-C-0643; F42620-00-D-0039
Report No.(s): AD-A483308; UDR-TR-2008-00070; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483308

In June 2003, UDRI was placed on contract, as prime, to lead in an effort to study the effect that corrosion has on the fatigue life of high-strength steels in Navy applications. In September 2005, UDRI was placed under contract to AES to continue the effort begun by the earlier program. In September 2006, UDRI was placed under contract to continue the effort begun under the two previous contracts. The Navy Corrosion-Fatigue Assessment Program was designed to ensure reliability and supportability of current and emerging Naval aircraft by providing requisite engineering support to evaluate issues relevant to corrosion-fatigue of airframe components. The purpose of these contracts was to develop tools that can be used to specify the maintenance options for corroded components and to provide a sound engineering basis for selecting the best fleet maintenance options. Essentially, the program was to provide quantifiably justified maintenance criteria for environmentally induced damage (i.e., corrosion) in high-strength steels. This document summarizes activities and accomplishments under these three contracts.
DTIC
Corrosion; Corrosion Resistance; Corrosion Tests; Fatigue Tests; Maintenance; Military Aircraft; Steels

20080041137 Dayton Univ. Research Inst., OH USA

Corrosion-Fatigue Assessment Program

Hoppe, Wally; Braisted, William; Pierce, Jennifer; Abfalter, Garry; Mar 31, 2008; 246 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-06-C-0643

Report No.(s): AD-A483309; UDR-TR-2008-00069; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483309

In June 2003, UDRI was placed on contract, as prime, to lead in an effort to study the effect that corrosion has on the fatigue life of high-strength steels on Navy applications In September 2005, UDRI was placed under contract to AES to continue the effort begun by the earlier program In September 2006, UDRI was placed under contract to continue the efforts from the two previous contracts. The Navy High-Strength Steel Corrosion-Fatigue Assessment Program was designed to ensure reliability and supportability of current and emerging Naval aircraft by providing requisite engineering support to evaluate issues relevant to corrosion-fatigue of airframe components. The purpose of these contracts was to develop tools that can be used to specify the maintenance options for corroded components and to provide a sound engineering basis for selecting the best fleet maintenance options. Essentially, the program was to provide quantifiably justified maintenance criteria for environmentally induced damage (i.e., corrosion) in high-strength steels.

DTIC

Corrosion; Corrosion Resistance; Corrosion Tests; Fatigue Tests; Maintenance; Military Aircraft; Steels

20080041174 Georgia Inst. of Tech., Atlanta, GA USA

Flexible Soldier and Machine Interface for Micro Air Vehicles

Costello, Mark; Beyer, Eric; May 19, 2006; 31 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-06-1-0473

Report No.(s): AD-A483443; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483443

The work reported here focused on the creation of a user friendly and flexible connection between the autopilot of a micro air vehicle and a laptop computer based ground station, and deployment of this environment to a micro air vehicle research flight test program. The objective in creating the ground station Graphical User Interface (GUI) was to provide basic connectivity to the air vehicle sensor suite. This includes the ability to send and receive control parameters, servo calibration parameters, sensor calibration parameters, and mission waypoints. Another objective of the autopilot interface is to connect it with the FalconView software package so route waypoints can be defined and current GPS fixes can be plotted on a map. It is also desirable to display time history data in real time as it is received. The objective to employ the developed interface to a micro air vehicle test program was fulfilled during a parafoil and payload micro air vehicle test program. The developed GUI was employed successfully on an autonomous parafoil airdrop program where direct longitudinal control was achieved through dynamic incidence angle changes of the parafoil canopy. Addition of this extra control channel requires simple rigging changes and an additional servo actuator. A set of air drops from an altitude of around 300 m was performed to demonstrate and validate glide slope control authority using dynamic incidence angle control. The ability of dynamic incidence angle to alter the glide slope of a parafoil and payload aircraft was demonstrated through a flight test program with a micro parafoil system.

DTIC

Drone Vehicles; Human-Computer Interface

20080041245 Naval Postgraduate School, Monterey, CA USA

Optimizing Unmanned Aircraft System Scheduling

Pearson, John L; Jun 2008; 95 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483449; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Unmanned Aircraft Systems (UASs) are critical for future combat effectiveness. Military planners from all branches of the Department of Defense now recognize the value that real time intelligence and surveillance from UASs provides the battlefield commander. The Operations Analysis Division of the Marine Corps Combat Development Command is currently conducting an Overarching Unmanned Aircraft Systems study to determine future force requirements. Current analysis is conducted through the use of the Assignment Scheduling Capability for Unmanned Air Vehicles (ASC-U) and several specially designed heuristics. The Unmanned Aircraft System Scheduling Tool (UAS-ST) combines these capabilities into one model and addresses several issues associated with ASC-U. UAS-ST allows the user to control all aspects of the UAS, define a scenario, and then generates a flight schedule over a known time horizon based on those inputs. All missions are assigned

a user defined value and the total schedule value is reported. The user can then quickly change a parameter of the UAS, re-solve the model, and see the impact their proposed change has on the overall value of the schedule attained. Therefore, UAS-ST is a tool for analyzing the value of future changes in UAS structure.
DTIC
Computer Networks; Drone Vehicles; Pilotless Aircraft; Scheduling

20080041264 Naval Postgraduate School, Monterey, CA USA
Allocation of UAV Search Efforts Using Dynamic Programming and Bayesian Updating
McCadden, Kevin; Nigus, Christopher; Jun 2008; 87 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483499; No Copyright; Avail.: Defense Technical Information Center (DTIC)

As unmanned aerial vehicle (UAV) technology and availability improves, it becomes increasingly more important to operate UAVs efficiently. Utilizing one UAV at a time is a relatively simple task, but when multiple UAVs need to be coordinated, optimal search plans can be difficult to create in a timely manner. In this thesis, we create a decision aid that generates efficient routes for multiple UAVs using dynamic programming and a limited-look-ahead heuristic. The goal is to give the user the best knowledge of the locations of an arbitrary number of targets operating on a specified graph of nodes and arcs. The decision aid incorporates information about detections and nondetections and determines the probabilities of target locations using Bayesian updating. Target movement is modeled by a Markov process. The decision aid has been tested in two multi-hour field experiments involving actual UAVs and moving targets on the ground.
DTIC
Bayes Theorem; Drone Vehicles; Dynamic Programming

20080041271 Naval Postgraduate School, Monterey, CA USA
Use of Information Technology Tools in Source Selection Decision Making: A Study on USAF's KC-X Tanker Replacement Program
Kaymaz, Sidar; Diri, Alaattin; Jun 2008; 171 pp.; In English
Report No.(s): AD-A483510; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The source selection phase in government acquisitions is so complicated in nature because it involves multi-criteria decision making that is supposed to respond to various requirements and subjectivity is usually inevitable in this kind of a decision making process. The purpose of this project is to demonstrate how the USAF's current source selection method (color rating method) is incompetent in showing small differences between proposed products, how this inadequacy leads to subjective decisions, and that the use of information technology tools can augment objectivity in this process. In this study, USAF's KC-X Tanker Replacement Program has been selected as the program to be used to frame the research questions. Two models with two versions built on Microsoft Excel spreadsheets using publicly available KC-X program data are used to compare the USAF's color rating method and weighted sum method, which is a multi-criteria decision making tool. It is presented that if the USAF had used the weighted sum method as its evaluation method, the winner of the KC-X program could have been different. The findings prove that the color rating method is not capable of reflecting small differences and information technology tools can help decision makers choose the best value offeror with less subjectivity.
DTIC
Decision Making; Information Systems; Replacing; Tanker Aircraft

20080041272 Naval Postgraduate School, Monterey, CA USA
Analysis of Contractor Logistics Support for the P-8 Poseidon Aircraft
Tallant, Shane; Hedrick, Scott; Martin, Michael; Jun 2008; 103 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483513; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This study assesses the costs as an independent variable (CAIV) of the maintenance manpower of both the original equipment manufacturer (OEM) contractor logistics support (CLS) and an estimated organic Navy compliment for the P-8 Poseidon program. Comparisons to similar aircraft procurements will be analyzed for possible benefits and limitations regarding a single source provider of CLS. Furthermore, current logistic acquisition culture and operational impacts will be reviewed in order to determine feasibility and possible further research.
DTIC
Aircraft; Contractors; Logistics Management

20080041297 Naval Postgraduate School, Monterey, CA USA

An Analysis of Port-Visit Costs of U.S. Navy Aircraft Carriers

Adams, Jason W; Jun 2008; 81 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483584; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The USA Navy is seeking substantial cost savings in the operation of its aircraft carrier fleet, including the costs of port visits. This thesis analyzes data on aircraft carrier port visits from fiscal years 2002 through 2007 to develop statistical models for characterizing and predicting port-visit costs. The models account for explanatory factors that include the ship and port, whether the ship is moored pier side or at anchor, length of the port visit, and the arrival date. A total of 13 U.S. Navy Carrier Vessel (CV) and Carrier Vessel Nuclear (CVN) aircraft carriers made 118 visits to ports in 25 countries during the period under study. For each port visit, individual line-item expenses are aggregated into four categories and by total cost. Regression modeling is then used to identify factors that explain these categorized and total costs. For total costs, the average regression prediction error is about 17 percent. Costs are found to vary across ships and, more substantially, across ports. These findings can be used in the formulation of initiatives aimed at reducing the costs of aircraft carrier port visits. An automated spreadsheet tool is developed to implement the modelling techniques presented in the thesis.

DTIC

Aircraft Carriers; Costs; Military Aircraft; Navy

20080041305 Defence Science and Technology Organisation, Victoria, Australia

Application of an X-ray Fluorescence Instrument to Helicopter Wear Debris Analysis

Becker, Andrew; Apr 2008; 65 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483603; DSTO-TR-2116; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This report describes the application of an X-ray Fluorescence (XRF) instrument to determine the composition of wear debris collected from helicopter magnetic chip detectors and oil filters. The Twin-X XRF (assessed in this report) is a commercially produced bench-top XRF and has not previously been applied to wear debris analysis of Australian Defence Force aircraft. The primary aim is to establish its ability to identify the composition of wear debris locally (i.e. at the operational base level). This will enable timely and informed decisions to be made regarding maintenance action following magnetic chip detector indications or oil filter bypass events. This report has shown that the Twin-X XRF is capable of providing valuable information about the composition of wear debris from aircraft oil-wetted systems.

DTIC

Debris; Fluorescence; Helicopters; Wear; X Ray Fluorescence; X Rays

20080041322 Naval Postgraduate School, Monterey, CA USA

A Heuristic Algorithm for Optimized Routing of Unmanned Aerial Systems for the Interdiction of Improvised Explosive Devices

Scioletti, Michael S; Jun 2008; 61 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483643; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Improvised explosive devices (IEDs) are effective weapons for insurgents targeting conventional military and security forces. Real-time information gathering about likely use of such weapons is one approach to reduce the effectiveness of IEDs. Unmanned aerial system (UASs) may provide the information gathering capability commanders need to interdict IEDs. Currently, UASs are not systematically utilized in that capacity. This research develops a routing tool that uses column-generation techniques and a greedy algorithm to route UASs through suspected IED locations for the purpose of IED interdiction as it transit to and from command directed missions. In empirical studies of data sets with up to 125 IED locations and missions, the routing tool provides optimal or near-optimal solutions in all instances tested. The tool produces de-conflicted routes for up to three UASs within five minutes of computing time.

DTIC

Algorithms; Drone Vehicles; Explosive Devices; Heuristic Methods

20080041333 Naval Postgraduate School, Monterey, CA USA

Experimental Investigation of a Six Inch Diameter, Four Inch Span Cross-Flow Fan

Ulvin, Jessica; Jun 2008; 79 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483658; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Investigations into the use of a cross-flow fan as a potential source of propulsion and lift have arisen due to the crossflow fan's geometry, light weight and safety by shielding from bystanders. The application of a cross-flow fan as the propulsion

source for a fan-wing vertical takeoff and landing vehicle has drawn attention in recent years. Previous investigations have demonstrated the performance characteristics of multiple cross-flow fan configurations. During this experiment a cross-flow fan with 30 blades, a 6 inch diameter and a 4 inch span was tested. The performance and stall characteristics were determined and plotted along constant speed and constant throttle setting lines. Comparison of the tested cross-flow fan was made against two previously tested cross-flow fans with similar design and 1.5 inch and 6 inch span lengths. Performance parameters of the three cross flow fans were compared and plotted for constant speed curves. The results allowed for general trends to be determined and scaling laws to be deduced.
DTIC
Cross Flow; Propulsion System Configurations; Propulsion System Performance; Vertical Takeoff Aircraft

20080041340 Industrial Coll. of the Armed Forces, Washington, DC USA
An Israeli Military Innovation: UAVs
Sanders, Ralph; Jan 2003; 6 pp.; In English
Report No.(s): AD-A483682; No Copyright; Avail.: Defense Technical Information Center (DTIC)

It should not be surprising that Israel has become a leader in military innovation given the demands of national security. Among the technologies that it has advanced are unmanned aerial vehicles (UAVs). Even though other nations have conducted experiments with these vehicles, Israel developed and fielded them as battlefield systems. UAVs are non-rocket-propelled aircraft that fly within the atmosphere and do not require humans on board to operate them. With aerodynamic features that enable them to lift and carry lethal as well as nonlethal payloads, unmanned aerial vehicles perform missions such as reconnaissance, command and control, and deception. They are not intended to replace air crews but to augment them for certain missions. UAVs are relatively simple and sturdy, taking off and landing conventionally under the control of rated pilots located on the ground. They are sometimes preprogrammed and range in design from modern aircraft to missiles. Israel and America have invested heavily in these vehicles because of their combat performance, versatility, and low cost; thus UAVs are entering a new phase in their development. Given the fact that Israel has fought six wars and is engaged in counterterrorist operations of major proportions at present, its defense officials can employ UAVs across a range of missions. Advocates are optimistic because of the advent of lightweight composite structures, reliable digital flight control systems, miniaturized sensors, and strong data links. This article reviews the history of Israel's use of UAVs in military operations; how the UAV industry started in Israel, including the companies pioneering their production and early models; the UAV's qualifications as force multipliers; the advantages of using UAVs on the battlefield; the role of UAVs in theater missile defense, counterterrorism, and urban warfare; UAV limitations; and foreign military sales of UAVs from Israel to other countries.
DTIC
Drone Vehicles; Industries; Israel; Military Operations; Missile Defense; Pilotless Aircraft

20080041450 Sterne, Kessler, Goldstein and Fox, PLLC, Washington, DC, USA; Mitre Corp., McLean, VA, USA
Tactical Aircraft Check Algorithm, System and Method
Arthur, W. C., Inventor; Kirk, D. B., Inventor; 24 Nov 04; 15 pp.; In English
Contract(s)/Grant(s): DTFA01-01-C-00001
Patent Info.: Filed Filed 24 Nov 04; US-Patent-Appl-SN-10-995 173
Report No.(s): PB2008-103826; No Copyright; Avail.: CASI: A03, Hardcopy

A method of generating aircraft tactical alerts includes receiving track positions for two aircraft; receiving trajectories and static conformance bounds for the two aircraft; receiving current position for the two aircraft; generating tactical check segments and variable conformance bounds for the two aircraft based on the current position, the static conformance bounds, trajectory, adapted data, and the track positions; and generating a tactical alert if the variable conformance bounds overlap within a specified lookahead time. The variable conformance bounds can be either symmetric or asymmetric about projected tracks. The variable conformance bounds can use step functions, or continuously widening bounds up to the static conformance bounds. The variable conformance bounds can be based on modifying the static conformance bounds in two or three spatial dimensions.
NTIS
Algorithms; Patent Applications

20080041452 International Civil Aviation Organization, Montreal, Quebec, Canada

Improving the First Order Approximation (FOA) for Characterization Particulate Matter Emissions from Aircraft Engines

Eyers, C.; January 2007; 9 pp.; In English

Report No.(s): PB2008-102550; CAEP/WG3/AEMTG/WP5-08; No Copyright; Avail.: National Technical Information Service (NTIS)

The concept of a First Order Approximation for characterising aircraft engine particulate emissions is welcomed. It potentially fills a gap in the available tools to support airport emissions inventories. Although only a first order approximation, it is important that the method is founded on the best quality available data and is mathematically sound. For non-volatile particles, this paper suggests a refinement to the data sources on which the Smoke Number (SN) algorithm is based and a revision to the calculation of the mass/SN relationship. Suggestions are also made regarding volatile particle estimation.

NTIS

Characterization; Exhaust Emission; Particulates

20080041494 Naval Postgraduate School, Monterey, CA USA

Hybrid Airship Multi-Role (HAMR) Anti-Submarine Warfare (ASW) Mission Capability

Agpaoa, Roy; Cawley, Matthew; Cossey, Chad; Galvan, Jose; Giang, Alan; Hanchinamani, Joseph; Ikeda, Jeffrey; Kenney, John; Magnusson, Lance; Martinez, Christopher; Jun 20, 2008; 196 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483334; NPS-SE-08-003; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483334

The Hybrid Airship Multi-Role (HAMR) Anti-Submarine Warfare (ASW) Mission Module project applies established systems engineering principles and processes to the design of an ASW payload module that examines the capability of the HAMR to perform persistent ASW mission support. Critical system functions and objectives are identified and are assigned appropriate quantitative metrics. Additionally, three alternative architectures are generated and evaluated using the appropriate metrics based on results from modeling using Naval Systems Simulation (NSS). Manning is considered as a key stakeholder parameter and is included as an evaluation concern. The alternatives are also compared through the examination of life cycle costs. The recommendation to the stakeholders based on the research and results is an unmanned ASW sensor platform that uses other ASW assets for prosecution.

DTIC

Airships; Detectors; Warfare

20080041519 NASA Dryden Flight Research Center, Edwards, CA, USA

Structural Model Tuning Capability in an Object-Oriented Multidisciplinary Design, Analysis, and Optimization Tool

Lung, Shun-fat; Pak, Chan-gi; September 14, 2008; 17 pp.; In English; 26th ICAS Congress, 14-19 Sep. 2008, Anchorage, AK, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

Updating the finite element model using measured data is a challenging problem in the area of structural dynamics. The model updating process requires not only satisfactory correlations between analytical and experimental results, but also the retention of dynamic properties of structures. Accurate rigid body dynamics are important for flight control system design and aeroelastic trim analysis. Minimizing the difference between analytical and experimental results is a type of optimization problem. In this research, a multidisciplinary design, analysis, and optimization [MDAO] tool is introduced to optimize the objective function and constraints such that the mass properties, the natural frequencies, and the mode shapes are matched to the target data as well as the mass matrix being orthogonalized.

Author

Dynamic Structural Analysis; Finite Element Method; Mathematical Models; Multidisciplinary Design Optimization; Aircraft Design; Design Optimization; Aircraft Models

20080041566 NASA Dryden Flight Research Center, Edwards, CA, USA

Structure Computation of Quiet Spike[Trademark] Flight-Test Data During Envelope Expansion

Kukreja, Sunil L.; Journal of Aircraft; September 2008; Volume 45, No. 5; 6 pp.; In English; Original contains color and black and white illustrations

Report No.(s): AIAA-32799-212; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080041566; http://dx.doi.org/10.2514/1.32799

System identification or mathematical modeling is used in the aerospace community for development of simulation

models for robust control law design. These models are often described as linear time-invariant processes. Nevertheless, it is well known that the underlying process is often nonlinear. The reason for using a linear approach has been due to the lack of a proper set of tools for the identification of nonlinear systems. Over the past several decades, the controls and biomedical communities have made great advances in developing tools for the identification of nonlinear systems. These approaches are robust and readily applicable to aerospace systems. In this paper, we show the application of one such nonlinear system identification technique, structure detection, for the analysis of F-15B Quiet Spike(TradeMark) aeroservoelastic flight-test data. Structure detection is concerned with the selection of a subset of candidate terms that best describe the observed output. This is a necessary procedure to compute an efficient system description that may afford greater insight into the functionality of the system or a simpler controller design. Structure computation as a tool for black-box modeling may be of critical importance for the development of robust parsimonious models for the flight-test community. Moreover, this approach may lead to efficient strategies for rapid envelope expansion, which may save significant development time and costs. The objectives of this study are to demonstrate via analysis of F-15B Quiet Spike aeroservoelastic flight-test data for several flight conditions that 1) linear models are inefficient for modeling aeroservoelastic data, 2) nonlinear identification provides a parsimonious model description while providing a high percent fit for cross-validated data, and 3) the model structure and parameters vary as the flight condition is altered.

Author

Aerospace Systems; Aircraft Design; Structural Analysis; Nonlinear Systems; System Identification; Flight Tests; Mach Number

20080041594 NASA Dryden Flight Research Center, Edwards, CA, USA

Helios Prototype Vehicle Mishap: Technical Findings, Recommendations, and Lessons Learned

DelFrate, John H.; September 10, 2008; 31 pp.; In English; High Altitude Long Endurance (HALE), Non-linear Aeroelastic Tools Workshop, 10-11 Sep. 2008, Alexandria, VA, USA; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080041594

Instability associated with the Helios Prototype HPO3-2 vehicle was a nonlinear stability and control problem involving complex interactions among the flexible structure, the unsteady aerodynamics, the flight control system, the environmental conditions, and vehicle flight dynamics. Analysis tools and solution techniques were constrained by conventional and segmented linear methodologies that did not provide the proper level of complexity to understand the technology interactions on the vehicle s stability and control characteristics. More advanced, multidisciplinary (structures, aeroelastic, aerodynamics, atmospheric, materials, propulsion, controls, etc) ‘time-domain’ analysis methods appropriate to highly flexible, ‘morphing’ vehicles are required. Ground-test procedures and techniques appropriate to this class of vehicle are needed to validate new analysis methods and predictions

Author

Stability; Unsteady Aerodynamics; Helios 2; Flight Control; Aeroelasticity; Aerodynamics

20080041630 Duke Univ., Durham, NC USA

Measurement of Atmospheric Boundary Layer Turbulent Fluxes with the Duke University Helicopter Observation Platform (HOP) in Support of CHATS

Avissar, Roni; Mar 4, 2008; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-07-1-0233

Report No.(s): AD-A483818; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483818

The main objective of the Canopy Horizontal Array Turbulence Studies (CHATS) was to provide the relevant data needed to improve the parameterization of sub-filter-scale (SFS) processes in the roughness sub-layer that is affected by canopy-atmosphere interactions. For that purpose, NCAR deployed in March-June 2007 an array of sonic anemometers at different heights and lateral separations in a homogeneous walnut orchard in the Central Valley of California so as to capture the influence of the wake-scale motions in the lee of vegetation. Together with this array, other instruments (including a high tower and a new eye-safe lidar) were operating during the field campaign.

DTIC

Atmospheric Boundary Layer; Boundary Layers; Helicopters; Measurement; Observation; Platforms; Turbulence; Turbulent Flow

20080041650 Pennsylvania State Univ., University Park, PA USA

Performance Piezoelectric Airframes for Nano Air Vehicles

Kommepalli, H; Hirsh, A; Rahn, C; Tadigadapa, S; Jun 30, 2008; 17 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-07-1-0367

Report No.(s): AD-A483855; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483855

Currently, Unmanned Air Vehicles (UAVs) are too large to penetrate buildings for situational awareness and reconnaissance, emplace important sensors, and sample and return material. While a variety of Micro Air Vehicles have been built and flown that use propellers and flapping wings for lift generation, Nano Air Vehicles (NAVs), defined as weighing less than 10 grams with wingspans less than 7.5 cm, have yet to be flown. NAV-scale actuators and wings with the requisite range of motion, power, and efficiency do not exist. In this project, we used a newly developed micromachining process based on Inductively Coupled Plasma Reactive Ion Etching (ICP-RIE), for PZT chips to fabricate novel, high performance actuators for NAVs. A novel T-beam actuator was fabricated using ICP-RIE etching from the front of a bulk PZT chip. Masked electrode deposition created active and passive regions in the PZT structure. With a T-shaped cross section, and bottom and top flange and web electrodes, a cantilevered beam can bend in-plane and out-of-plane with bimorph actuation in both directions. One of these T-beam actuators was fabricated and experimentally tested. An experimentally validated model predicted that the cross-section geometry can be optimized to produce higher displacement and blocking force.

DTIC

Airframes; Piezoelectricity

20080041831 General Accounting Office, Washington, DC USA

Air Force Procurement. Aerial Refueling Tanker Protest

Gordon, Daniel I; Jul 10, 2008; 16 pp.; In English

Report No.(s): AD-A484202; GAO-08-991T; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Boeing Company protested the award of a contract to Northrop Grumman Systems Corporation by the Department of the Air Force for KC-X aerial refueling tankers. Boeing challenged the Air Force's technical and cost evaluations, conduct of discussions, and source selection decision. Because Boeing competed for the contract, it is an interested party for purposes of filing a protest. Under the Competition in Contracting Act of 1984, GAO is required to consider protests of contract awards filed by interested parties. In deciding protests, GAO makes a determination of whether the agency's actions complied with procurement statutes and regulations. Review of the extensive record, including a hearing, led GAO to conclude that the Air Force had made a number of significant errors that could have affected the outcome of what was a close competition between Boeing and Northrop Grumman. The errors included not assessing the relative merits of the proposals in accordance with the evaluation rules and criteria identified in the solicitation, not having documentation to support certain aspects of the evaluation, conducting unequal and misleading discussions with Boeing, and having errors or unsupported conclusions in the cost evaluation. Accordingly, GAO sustained Boeing's protest.

DTIC

Air to Air Refueling; Government Procurement; Procurement; Tanker Aircraft

20080041846 Naval Postgraduate School, Monterey, CA USA

Coordinated Autonomy for Persistent Presence in Harbor and Riverine Environments

Horner, D P; Healey, A J; Kaminer, I I; Kolsch, M; Kragelund, S P; Baer, W; Dobrokhodov, V; Jones, K D; Squire, K M; Masek, T D; Monarrez, A; Wring, B D; Sep 30, 2007; 14 pp.; In English

Contract(s)/Grant(s): MIPR-N0001406WR20337

Report No.(s): AD-A484236; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In FY 2007 the Naval Postgraduate School (NPS) teamed with Virginia Tech (VT) to conduct fundamental research and experimentation aimed at enabling coordinated autonomous operations by teams of heterogeneous (land, sea, air) vehicles. The primary goal of this research is to develop tools for vehicle-to-vehicle cueing and distributed sensing for shared situational awareness. A long-term goal for this research is persistent area surveillance of harbor and riverine environments by a 'distributed autonomous system' (DAS) of networked vehicles and sensors. Under this operational concept, aerial vehicles would function as long-range sensors and provide navigational cues to surface vehicles providing close-up video inspection or interdiction of suspicious vessels. Sensor data analysis and integration would provide automated scene analysis, object detection and tracking, and vision-based autonomous navigation. The system would exploit data from all vehicles and sensors to produce three dimensional maps of the operating environment, buildings, ships, etc. The main objective of this project was to develop underlying tools and technologies needed to field and demonstrate coordinated operations with a team of

autonomous vehicles. To achieve this objective in the 16-month allotted time, the project team focused their efforts on a mutually interesting problem with relevance to current military operations: convoy support by autonomous vehicles. The technologies and capabilities developed by addressing this problem are necessary steps toward achieving our long-term goals in follow-on projects. The problem was decomposed into two near-term project objectives, with an emphasis on experimentation.
DTIC
Autonomy; Data Processing; Detectors; Drone Vehicles; Harbors; Scientific Visualization; Surveillance

20080041867 Alabama Univ., Huntsville, AL USA
Miniature Rotorcraft Flight Control Stabilization System
Slegers, Nathan; May 30, 2008; 39 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-07-1-0508
Report No.(s): AD-A484290; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Attitude determination algorithms for a small rotorcraft are proposed and compared. The first algorithm is based on the well known QUEST algorithm used for spacecraft and satellites Due to large vibration in sensors a pseudo-measurement is developed from gyroscope measurements and rotational kinematics. The pseudo-measurement is used within QUEST to smooth attitude estimations A second simple gyro-compensated tilt sensor and compass is proposed and compared to the optimal QUEST solution. Both algorithms are shown to have similar performance. The simple gyro-compensated tilt sensor and compass is demonstrated on a small autonomous hovering rotorcraft.
DTIC
Detectors; Flight Control; Kinematics; Miniaturization; Rotary Wing Aircraft

20080041875 Washington Univ., Saint Louis, MO USA
Mathematical and Computational Framework for Virtual Fabrication Environment for Aircraft Components
Szabo, Barna A; Mar 1, 2008; 10 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-05-1-0105
Report No.(s): AD-A484309; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This project had a general and a specific objective. The general objective was to investigate the question of how mathematical problems should be formulated so that they can serve as reliable and accurate representations of physical reality in the sense that they will provide predictions of events or states of systems that can be confirmed consistently by physical observations. The construction of such mathematical models involves processes, the main elements of which are calibration, prediction, evaluation and modification. The specific objective was the development of the mathematical and computational aspects of a knowledge base needed for the creation of a virtual fabrication environment for aircraft components manufactured from 7050-T7451 aluminum plate stock so that the incidence of re-working and scrapping of partially or fully manufactured parts can be substantially reduced.
DTIC
Aircraft Equipment; Engine Parts; Fabrication

20080041898 Air Force Flight Test Center, Edwards AFB, CA USA
Handling Qualities Evaluation of a Supersonic Tailless Air Vehicle
Speares, Steven W; Mar 2008; 209 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484360; AFIT/GAE/ENY/08-M25; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This thesis presents the results of a handling qualities evaluation of a supersonic tailless air vehicle. The 2006 Quadrennial Defense Review mandated the need for the next generation of long-range strike aircraft by 2018. Due to speed and stealth requirements, this resulted in a tailless aircraft with an instantaneous center of rotation located well forward of that of a conventional aircraft. This thesis examines how this center of rotation affected pilot handling qualities ratings. This effect should have been the most pronounced during approach and landing, and was where the testing focused. The goal of this research was to develop a systematic procedure for evaluating the handling qualities of this aircraft, and to determine how different pilot flying techniques or pilot-inceptor interactions influenced them. This procedure was demonstrated in simulator testing and in flight testing on the Calspan-operated Total In-Flight Simulator aircraft.
DTIC
Controllability; Supersonic Aircraft; Tailless Aircraft

20080041909 Aerospace Medical Research Labs., Wright-Patterson AFB, OH USA
50 Years of Research on Man in Flight
Dempsey, Charles A; Jan 1985; 249 pp.; In English
Report No.(s): AD-A484413; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This 50th Anniversary Celebration is a gala review of the last half century of research in aviation medicine. This research has fundamentally shaped the evolution of aircraft design from the wood and wire biplanes to the Space Shuttle. Many renowned scientists have worked in this creative multidisciplinary environment, to evolve pioneering knowledge and established world records that have stood the test of time. Their numbers are legend. Their efforts are unsurpassed anywhere in the world. The published literature from 1935 to 1985 has set the standard for air vehicle design in this country and abroad. Wherever man interfaces with the air vehicle, the mark of aeromedical research is clearly evident in both the hardware design and its functional operation. It is the integration of engineering and medicine which made these achievements possible. The next half century will make even bolder strokes in manned flight.
DTIC
Aerospace Medicine; Aircraft Design

20080042003 Harvard Univ., Cambridge, MA USA
Research and Demonstration of Video Streaming on Unmanned Aerial Vehicles (UAV) Networks
Kung, H T; May 2008; 16 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-06-2-0154; Proj-VSUA
Report No.(s): AD-A483145; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483145

This project has led to a number of findings and conclusions. The main results concern the task of using one or more Unmanned Aerial Vehicles (UAVs) to relay messages or videos between two distant ground nodes. A protocol, called load-carry-and-deliver (LCAD), has been developed and implemented, where a UAV load from a source ground node, carries the data while flying to the destination, and finally delivers the data to a destination ground node. For delay-tolerant applications like latency-insensitive bulk data transfer and video streaming, it is demonstrated in field experiments that LCAD can maximize throughput. In addition, the project delivered a simple lab demonstration system to AFRL which shows the feasibility of dynamically adapting video source coding, based on the quality of the video transporting wireless link.
DTIC
Drone Vehicles; Loads (Forces); Pilotless Aircraft; Video Signals; Wireless Communication

20080042010 Creative Step, LLC, Belmont, MA USA
Next Generation Information Systems Architectures
Kung, H T; Jul 2008; 34 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-05-1-0098; Proj-558B
Report No.(s): AD-A484213; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This effort concerns a new aerial ad-hoc networking paradigm, in which low-altitude unmanned aerial vehicles (UAVs) are used to assist wireless communication among a set of stationary or mobile ground stations. This work focuses on the use of cost-effective Commercial Off-The-Shelf (COTS) equipment. New networking protocols have been developed based on antenna engineering and interference-resilient medium access control (MAC) schemes. In addition, the project has gathered a substantial amount of measurement data from aerial field experiments to support future design activities such as throughput-optimizing flight-path design.
DTIC
Aircraft; Information Systems; Radiotelephones

20080042091 General Dynamics Advanced Information Systems, Dayton, OH USA
Considerations and Experiences in Developing a Finite Element Buttock Model for Seating Comfort Analysis
Cheng, Zhiqing; Smith, Jeanne A; Pellettiere, Joseph A; Fleming, Scott M; Jun 2007; 12 pp.; In English
Contract(s)/Grant(s): FA8650-04-D-6472; Proj-2830
Report No.(s): AD-A483758; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483758

The comfort of seat cushions has become important in many of today's high-performance USAF fighter and tactical aircraft. Experimental investigations have found that there exists a strong relationship between the human subjective

discomfort rating for a seat cushion and the pressure distribution on the interface between the cushion and the buttocks. For the analysis of the contact pressure distribution, a finite element model of the human buttock was developed. The model consists of a detailed geometric description of the skin, soft tissues, and bony structures. The development of the model is described in this paper, which includes source data selection, bony structure modeling, joint modeling, soft tissue modeling, and pelvis shape morphing.
DTIC
Comfort; Computerized Simulation; Finite Element Method; Mathematical Models; Seats

20080042147 Air Force Research Lab., Rome, NY, USA
Method for Aerial Rearmament of Aircraft
Beyerle, J. A., Inventor; Illingworth, G. L., Inventor; 31 Jan 05; 12 pp.; In English
Patent Info.: Filed Filed 31 Jan 05; US-Patent-Appl-SN-11-052 173
Report No.(s): PB2008-104527; No Copyright; Avail.: CASI: A03, Hardcopy

The invention provides a method for the aerial transfer of munitions from a rearming aircraft to the weapons pylon of the recipient combat aircraft. The invention also provides for the selection of munitions from a database of munitions and aircraft types in response to an Air Tasking Order. The invention allows a variety of combat aircraft to be adapted to aerial rearmament. The invention also allows the release of precision guided munitions directly from a rearming aircraft so that orbiting combat aircraft can guide these munitions to the target by remote control.
NTIS
Patent Applications; Fighter Aircraft; Remote Control

20080042169 Big Fun Development Corp., Berkeley Lake, GA USA
AvantGuard: An Instrument to Explore Autonomy
Jacobson, Dov; Waugh, Stephanie; Jacobson, Jesse; DiCesare, Thomas; Hobbs, Edward; Nov 2007; 58 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8650-05-C-6548; Proj-3005
Report No.(s): AD-A483775; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483775

AvantGuard is a human factors research testbed developed with game technology and game concepts. It is used to study the effects of autonomy on a single operator supervising multiple unmanned aerial vehicles (UAVs). The synthetic task environment presents a fly-ahead convoy protection mission. Adversaries hide in the urban environment and prepare to attack. Using an innovative control interface, the operator directs the UAVs, studies their sensor streams, assesses danger and guides the convoy. AvantGuard provides a complex environment centered on four tasks: threat surveillance, threat detection, threat assessment, and threat avoidance. The level of autonomy (LOA) of each task is set independently from a broad range. The lowest autonomy levels demand full human attention. Middle levels offer limited operator intervention. The highest levels are fully automated, performed without the awareness of the operator. An interactive tool enables the researcher to sculpt autonomy profiles for comparative studies. A scenario development kit offers access to the synthetic environment. Each game-like session yields analytic performance metrics.
DTIC
Autonomy; Drone Vehicles; Man Machine Systems

20080042184 General Dynamics Advanced Information Systems, Dayton, OH USA
Development of a Supervisory Control Rating Scale
Lintern, Gavan; Hughes, Thomas; Jan 2008; 35 pp.; In English
Contract(s)/Grant(s): F33615-01-D-3105-D00058; Proj-7184
Report No.(s): AD-A483792; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483792

The objective was to develop a supervisory control rating scale to evaluate human interaction and capabilities associated with automation. The product was to be a standardized rating scale analogous to the Cooper-Harper Rating Scale that was developed to assess aircraft handling response. The use intended for the scale developed under the current project is to evaluate supervisory control across situations and human-system interface concepts in a manner that reflects supervisor's workload, situational awareness, and complacency. The report summarizes a review/analysis of related literature and the initial scale

development process. Additional studies are required to examine the psychometric properties of the scales including sensitivity, reliability (internal consistency, interrater, test-retest), and construct validity.
DTIC
Aircraft; Human-Computer Interface; Ratings

20080042224 Geological Survey, Denver, CO USA
Deconvolution of Plant Type(s) for Homeland Security Enforcement Using Remote Sensing on a UAV Collection Platform
Tindall, James A; Jan 2006; 18 pp.; In English
Report No.(s): AD-A484268; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The technological ability to distinguish drug plants from other plant types, termed deconvolution, can be a valuable technological tool in the fight against drug trafficking and the war on terrorism. The use of computers and associated hardware as well as data bases and high-speed computing capabilities are an integral part of the technological process that makes possible plant species identification from airborne sensors. This paper will focus on utilizing Synthetic Aperture Radar (SAR) and/or hyperspectral imagery coupled with a neural network to successfully achieve deconvolution. The proposed approach can be accomplished from an airborne or space-based platform (airplane or satellite) using a hyperspectral sensor or SAR. This research will focus on mounting either a SAR or hyperspectral sensor aboard a small unmanned aerial vehicle (UAV). A suitable UAV would be the Silver Fox developed by Advanced Ceramics Research in Arizona. The Silver Fox is much, much less costly that other UAVs, like the multi-million dollar Predator used by the military. Also, the costs to correctly set up, test, and calibrate such a system are small compared to the potential use and value-added results of the technology if it were applied to the war on drugs. The system described in this article would be a practical surveillance system for local law enforcement agencies, the Drug Enforcement Agency (DEA), or the Department of Homeland Security, as it could be used for the surveillance of many different kinds of targets.
DTIC
Detection; Drone Vehicles; Drugs; Imagery; Remote Sensing; Security; Surveillance; Synthetic Aperture Radar; Target Recognition

20080042271 Armstrong Lab., Mesa, AZ USA
Situation Assessment and Decision Making in Skilled Fighter Pilots
Waag, Wayne L; Bell, Herbert H; Jan 1997; 9 pp.; In English
Contract(s)/Grant(s): Proj-1123
Report No.(s): AD-A483733; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483733

This chapter presents preliminary findings from an attempt to identify situation assessment and decision making processes that account for differences in observed mission performance among skilled fighter pilots. The impetus for the study came directly from the US Air Force Chief of Staff. In 1991, he posed a number of questions concerning situation awareness 'SA' for the F-15 fighter world. From a naturalistic, as well as an operational Air Force perspective, SA is more than simply knowledge and understanding of the environment.
DTIC
Decision Making; Fighter Aircraft; Pilots

20080042380 NASA Dryden Flight Research Center, Edwards, CA, USA
A Software Framework for Aircraft Simulation
Curlett, Brian P.; October 2008; 36 pp.; In English; Original contains color illustrations
Report No.(s): NASA/TM-2008-214639; H-2880; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080042380

The National Aeronautics and Space Administration Dryden Flight Research Center has a long history in developing simulations of experimental fixed-wing aircraft from gliders to suborbital vehicles on platforms ranging from desktop simulators to pilot-in-the-loop/aircraft-in-the-loop simulators. Regardless of the aircraft or simulator hardware, much of the software framework is common to all NASA Dryden simulators. Some of this software has withstood the test of time, but in recent years the push toward high-fidelity user-friendly simulations has resulted in some significant changes. This report

presents an overview of the current NASA Dryden simulation software framework and capabilities with an emphasis on the new features that have permitted NASA to develop more capable simulations while maintaining the same staffing levels. Author

Computerized Simulation; Fixed Wings; Research Aircraft; NASA Programs

06
AVIONICS AND AIRCRAFT INSTRUMENTATION

Includes all avionics systems, cockpit and cabin display devices, and flight instruments intended for use in aircraft. For related information see also 04 Aircraft Communications and Navigation; 08 Aircraft Stability and Control; 19 Spacecraft Instrumentation and Astrionics; and 35 Instrumentation and Photography.

20080041514 NASA Dryden Flight Research Center, Edwards, CA, USA

Real-time In-Flight Strain and Deflection Monitoring with Fiber Optic Sensors

Richards, Lance; Parker, Allen R.; Ko, William L.; Piazza, Anthony; August 05, 2008; 17 pp.; In English; Space Sensors and Measurements Techniques Workshop, 5 Aug. 2008, Nashville, TN, USA; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080041514

This viewgraph presentation reviews Dryden's efforts to develop in-flight monitoring based on Fiber Optics. One of the motivating factors for this development was the breakup of the Helios aircraft. On Ikhana the use of fiber optics for wing shape sensing is being developed. They are being used to flight validate fiber optic sensor measurements and real-time wing shape sensing predictions on NASA's Ikhana vehicle; validate fiber optic mathematical models and design tools; Assess technical viability and, if applicable, develop methodology and approach to incorporate wing shape measurements within the vehicle flight control system, and develop and flight validate advanced approaches to perform active wing shape control.

CASI

Fiber Optics; In-Flight Monitoring; Real Time Operation; Shape Control; Wings; Wing Profiles

07
AIRCRAFT PROPULSION AND POWER

Includes primary propulsion systems and related systems and components, e.g., gas turbine engines, compressors, and fuel systems; and onboard auxiliary power plants for aircraft. For related information see also 20 Spacecraft Propulsion and Power; 28 Propellants and Fuels; and 44 Energy Production and Conversion.

20080040806 Pratt and Whitney Aircraft, East Hartford, CT, USA

Protective Coatings (PAT-APPL-10-992 992)

Eaton, H. E., Inventor; Bhatia, T., Inventor; Sun, E. Y., Inventor; Lawton, T. H., Inventor; 19 Nov 04; 15 pp.; In English

Contract(s)/Grant(s): N00014-01-C-0032

Patent Info.: Filed Filed 19 Nov 04; US-Patent-Appl-SN-10-992 992

Report No.(s): PB2008-103844; No Copyright; Avail.: CASI: A03, Hardcopy

Protective coatings are described herein. Embodiments of these coatings comprise substantially only specific equilibrium phases therein, and have a CTE that is substantially equal to the CTE of the substrate upon which the coating is deposited. The desired coatings can be obtained by controlling the application of the coating and/or by heat treating the coated substrate to create the desired phases or microstructure in the coating.

NTIS

Patent Applications; Protective Coatings

20080040877 Carlson, Gaskey and Olds, PC, Birmingham, MI, USA; United Technologies Corp., East Hartford, CT, USA

Inner Plenum Wall Liner (PAT-APPL-11-024 918)

Farah, J., Inventor; 29 Dec 04; 5 pp.; In English

Contract(s)/Grant(s): N00019-02-C-3003

Patent Info.: Filed Filed 29 Dec 04; US-Patent-Appl-SN-11-024 918

Report No.(s): PB2008-103906; No Copyright; Avail.: CASI: A01, Hardcopy

An exhaust nozzle assembly includes an inner liner exposed to hot combustion gases and an outer liner spaced a radial distance from the inner liner to form an annular chamber. The inner liner includes a hot side that is directly exposed to the

hot combustion gas flow and a cold side is exposed to cooling air within the chamber. The outer liner includes an outer surface exposed to cooling air flow up to a restriction preventing communication of cooling air flow. A plenum is attached to the outer liner to define a plenum chamber that extends into an end portion. The plenum chamber receives cooling air flow from a supply opening and communicates that air to an end portion through a plurality of impingement openings that provide impingement flow of cooling air outboard of the restriction.
NTIS
Linings; Patent Applications; Walls

20080040896 Siemens Corp. Research, Princeton, NJ, USA
Recuperated Atmospheric SOFC/Gas Turbine Hybrid Cycle
Lundberg, W., Inventor; 18 Nov 04; 7 pp.; In English
Contract(s)/Grant(s): DE-FC 26-97FT34139
Patent Info.: Filed Filed 18 Nov 04; US-Patent-Appl-SN-10-992 182
Report No.(s): PB2008-103870; No Copyright; Avail.: CASI: A02, Hardcopy

A method of operating an atmospheric-pressure solid oxide fuel cell generator in combination with a gas turbine comprising a compressor and expander where an inlet oxidant is passed through the compressor and exits as a first stream and a second stream the first stream passing through a flow control valve to control flow and then through a heat exchanger followed by mixing with the second stream where the mixed streams are passed through a combustor and expander and the first heat exchanger for temperature control before entry into the solid oxide fuel cell generator, which generator is also supplied with fuel.
NTIS
Atmospheric Chemistry; Atmospheric Composition; Fuel Cells; Gas Turbine Engines; Gas Turbines; Patent Applications; Solid Oxide Fuel Cells

20080040900 Pratt and Whitney Aircraft, East Hartford, CT, USA
Cooled Duct for Gas Turbine Engine
Cowan, C. C., Inventor; Farah, J. I., Inventor; Kehret, D. F., Inventor; Keysa, S., Inventor; Lavin, J. R., Inventor; 1 Dec 04; 7 pp.; In English
Patent Info.: Filed Filed 1 Dec 04; US-Patent-Appl-SN-11-000 829
Report No.(s): PB2008-104356; No Copyright; Avail.: CASI: A02, Hardcopy

A cooled exhaust duct for use in gas turbine engines is provided. The cooled exhaust duct includes an axial centerline, a circumference, an annulus, and a plurality of radially expandable bands. The annulus is disposed between a first wall and a second wall, and extends along the axial centerline. The first wall is disposed radially inside of the second wall. Each of the plurality of radially expandable bands extends circumferentially within the annulus. The bands are axially spaced apart from one another. Each band includes a first portion attached to the first wall, a second portion attached to the second wall and an intermediate portion connected to the first and second portions. The bands create circumferentially extending compartments that inhibit axial travel of the cooling air within the annulus.
NTIS
Ducts; Gas Turbine Engines

20080040901 Honeywell International, Inc., Morristown, NJ, USA
Twisted Mixer with Open Center Body
Anderson, M. G., Inventor; Ross, D. F., Inventor; 1 Dec 04; 14 pp.; In English
Contract(s)/Grant(s): DAAH10-03-2-0007
Patent Info.: Filed Filed 1 Dec 04; US-Patent-Appl-SN-11-000 730
Report No.(s): PB2008-104355; No Copyright; Avail.: CASI: A03, Hardcopy

An exhaust mixer assembly having a twisted mixer and an open centerbody is provided. The open centerbody is centrally disposed within the twisted mixer and helps to provide efficient cooling of exhaust air from gas turbine engines. A method for cooling exhaust air from a gas turbine engine using the exhaust mixer assembly of the invention is also provided.
NTIS
Centerbodies; Exhaust Emission; Gas Turbine Engines; Mixers; Patent Applications

20080040923 McCormick, Paulding and Huber, LLP, Hartford, CT, USA; United Technologies Corp., East Hartford, CT, USA

Augmentor Liner (PAT-APPL-11-025 402)

Prasad, D., Inventor; Feng, J., Inventor; Proscia, W., Inventor; 29 Dec 04; 8 pp.; In English

Contract(s)/Grant(s): F33657-99-D-2051-DO-0008

Patent Info.: Filed Filed 29 Dec 04; US-Patent-Appl-SN-11-025 402

Report No.(s): PB2008-103908; No Copyright; Avail.: CASI: A02, Hardcopy

This invention applies to augmented gas turbine engines in general, and to augementor liners in particular. An augmentor liner is provided that includes an annulus disposed between a first wall and a second wall, and a plurality of baffles. The first wall is disposed radially inside of the second wall. The plurality of baffles extend heightwise between the first wall and the second wall, and are circumferentially spaced apart from one another by a distance. The distance between adjacent baffles is such that an acoustic wave entering an annulus compartment will travel between the first wall and second wall in a direction having a radial component that is substantially greater than a circumferential component. The baffle spacing may alternatively be described as being such that the circumferential component of the acoustic wave is substantially damped and therefore does not materially contribute to undesirable screech.

NTIS

Augmentation; Gas Turbine Engines; Linings; Patent Applications

20080040924 Finnegan, Henderson, Farabow, Garrett, Dunner, LLP, Washington, DC, USA; Caterpillar, Inc., Peoria, IL, USA

Filter Desulfation System and Method

Lowe, M. D., Inventor; Robel, W. J., Inventor; Verkiel, M., Inventor; Driscoll, J. J., Inventor; 28 Dec 04; 11 pp.; In English

Contract(s)/Grant(s): DE-FC05-97OR22605

Patent Info.: Filed Filed 28 Dec 04; US-Patent-Appl-SN-11-022 692

Report No.(s): PB2008-103907; No Copyright; Avail.: CASI: A03, Hardcopy

A method of removing sulfur from a filter system of an engine includes continuously passing an exhaust flow through a desulfation leg of the filter system during desulfation. The method also includes sensing at least one characteristic of the exhaust flow and modifying a flow rate of the exhaust flow during desulfation in response to the sensing.

NTIS

Patent Applications; Sulfur; Desulfurizing; Filters; Flow Velocity

20080040941 Yoder (Patrick S. and Fletcher), Houston, TX, USA

Trapped Vortex Combustor Cavity Manifold for Gas Turbine Engine

Haynes, J. M., Inventor; Hojnacki, B. W., Inventor; 22 Nov 04; 14 pp.; In English

Contract(s)/Grant(s): DE-FC26-01NT41020

Patent Info.: Filed Filed 22 Nov 04; US-Patent-Appl-SN-10-994 833

Report No.(s): PB2008-103810; No Copyright; Avail.: CASI: A03, Hardcopy

In accordance with one embodiment, the present technique provides a combustor assembly for use in a gas-turbine device. The combustor assembly includes a first combustion zone and a second combustion zone. The combustor assembly further includes a first premix chamber configured to receive a fuel and air to facilitate a first fuel-air mixture having a first fuel-to-air ratio, wherein the first premix chamber is fluidiclly coupled to the combustion chamber at the first combustion zone. The combustor assembly also includes a second premix chamber configured to receive a fuel and air to facilitate a second fuel-air mixture having a second fuel-to-air ratio, wherein the second premix chamber is fluidiclly coupled to the combustion chamber at the second combustion zone, wherein the second combustion zone is radially outboard of the first combustion zone.

NTIS

Cavities; Combustion Chambers; Gas Turbine Engines; Patent Applications; Trapped Vortices; Vortices

20080041522 NASA Glenn Research Center, Cleveland, OH, USA

Signal Detection Theory Applied to Helicopter Transmission Diagnostic Thresholds

Dempsey, Paula J.; Keller, Jonathan A.; Wade, Daniel R.; July 2008; 23 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 659877.02.03.0550.01

Report No.(s): NASA/TM-2008-215262; E-16530; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080041522

Helicopter Health Usage Monitoring Systems (HUMS) have potential for providing data to support increasing the service

life of a dynamic mechanical component in the transmission of a helicopter. Data collected can demonstrate the HUMS condition indicator responds to a specific component fault with appropriate alert limits and minimal false alarms. Defining thresholds for specific faults requires a tradeoff between the sensitivity of the condition indicator (CI) limit to indicate damage and the number of false alarms. A method using Receiver Operating Characteristic (ROC) curves to assess CI performance was demonstrated using CI data collected from accelerometers installed on several UH60 Black Hawk and AH64 Apache helicopters and an AH64 helicopter component test stand. Results of the analysis indicate ROC curves can be used to reliably assess the performance of commercial HUMS condition indicators to detect damaged gears and bearings in a helicopter transmission.
Author
Helicopter Propeller Drive; Gears; Transmissions (Machine Elements); Support Systems; Service Life; Damage

20080041523 GE Global Research Center, Niskayuna, NY, USA
Model-Based Fault Tolerant Control
Kumar, Aditya; Viassolo, Daniel; September 2008; 99 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): NAS3-01135; WBS 645846.02.07.03.03.01
Report No.(s): NASA/CR-2008-215273; E-16555; No Copyright; Avail.: CASI: A05, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041523

The Model Based Fault Tolerant Control (MBFTC) task was conducted under the NASA Aviation Safety and Security Program. The goal of MBFTC is to develop and demonstrate real-time strategies to diagnose and accommodate anomalous aircraft engine events such as sensor faults, actuator faults, or turbine gas-path component damage that can lead to in-flight shutdowns, aborted take offs, asymmetric thrust/loss of thrust control, or engine surge/stall events. A suite of model-based fault detection algorithms were developed and evaluated. Based on the performance and maturity of the developed algorithms two approaches were selected for further analysis: (i) multiple-hypothesis testing, and (ii) neural networks; both used residuals from an Extended Kalman Filter to detect the occurrence of the selected faults. A simple fusion algorithm was implemented to combine the results from each algorithm to obtain an overall estimate of the identified fault type and magnitude. The identification of the fault type and magnitude enabled the use of an online fault accommodation strategy to correct for the adverse impact of these faults on engine operability thereby enabling continued engine operation in the presence of these faults. The performance of the fault detection and accommodation algorithm was extensively tested in a simulation environment.
Author
Fault Tolerance; Kalman Filters; Thrust Control; Aircraft Safety; Fault Detection; Turbines; Flight Safety

20080041526 NASA Glenn Research Center, Cleveland, OH, USA
Assessment of Current Jet Noise Prediction Capabilities
Hunter, Craid A.; Bridges, James E.; Khavaran, Abbas; September 2008; 27 pp.; In English; 14th Aeroacoustics Conference, 5 - 7 May 2008, Vancouver, Canada; Original contains color and black and white illustrations
Report No.(s): NASA/TM-2008-215275; AIAA Paper 2008-2933; E-16545; Copyright; Avail.: CASI: A03, Hardcopy

An assessment was made of the capability of jet noise prediction codes over a broad range of jet flows, with the objective of quantifying current capabilities and identifying areas requiring future research investment. Three separate codes in NASA s possession, representative of two classes of jet noise prediction codes, were evaluated, one empirical and two statistical. The empirical code is the Stone Jet Noise Module (ST2JET) contained within the ANOPP aircraft noise prediction code. It is well documented, and represents the state of the art in semi-empirical acoustic prediction codes where virtual sources are attributed to various aspects of noise generation in each jet. These sources, in combination, predict the spectral directivity of a jet plume. A total of 258 jet noise cases were examined on the ST2JET code, each run requiring only fractions of a second to complete. Two statistical jet noise prediction codes were also evaluated, JeNo v1, and Jet3D. Fewer cases were run for the statistical prediction methods because they require substantially more resources, typically a Reynolds-Averaged Navier-Stokes solution of the jet, volume integration of the source statistical models over the entire plume, and a numerical solution of the governing propagation equation within the jet. In the evaluation process, substantial justification of experimental datasets used in the evaluations was made. In the end, none of the current codes can predict jet noise within experimental uncertainty. The empirical code came within 2dB on a 1/3 octave spectral basis for a wide range of flows. The statistical code Jet3D was within experimental uncertainty at broadside angles for hot supersonic jets, but errors in peak frequency and amplitude put it out of experimental uncertainty at cooler, lower speed conditions. Jet3D did not predict changes in directivity in the downstream angles. The statistical code JeNo,v1 was within experimental uncertainty predicting noise from cold subsonic jets at all angles,

but did not predict changes with heating of the jet and did not account for directivity changes at supersonic conditions. Shortcomings addressed here give direction for future work relevant to the statistical-based prediction methods. A full report will be released as a chapter in a NASA publication assessing the state of the art in aircraft noise prediction.
Author
Supersonic Jet Flow; Jet Aircraft Noise; Prediction Analysis Techniques; Navier-Stokes Equation; Mathematical Models; Noise Generators

20080041561 NASA Glenn Research Center, Cleveland, OH, USA
Analysis of Plume Effects on Sonic Boom Signature for Isolated Nozzle Configurations
Castner, Raymond S.; August 2008; 21 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 984754.02.07.03.13.05
Report No.(s): NASA/TM-2008-215414; AIAA Paper 2008-3729; E-16535-1; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041561

Computational fluid dynamics (CFD) analysis has been performed to study the plume effects on sonic boom signature for isolated nozzle configurations. The objectives of these analyses were to provide comparison to past work using modern CFD analysis tools, to investigate the differences of high aspect ratio nozzles to circular (axisymmetric) nozzles, and to report the effects of underexpanded nozzle operation on boom signature. CFD analysis was used to address the plume effects on sonic boom signature from a baseline exhaust nozzle. Near-field pressure signatures were collected for nozzle pressure ratios (NPRs) between 6 and 10. A computer code was used to extrapolate these signatures to a ground-observed sonic boom N-wave. Trends show that there is a reduction in sonic boom N-wave signature as NPR is increased from 6 to 10. The performance curve for this supersonic nozzle is flat, so there is not a significant loss in thrust coefficient as the NPR is increased. As a result, this benefit could be realized without significant loss of performance. Analyses were also collected for a high aspect ratio nozzle based on the baseline design for comparison. Pressure signatures were collected for nozzle pressure ratios from 8 to 12. Signatures were nearly twice as strong for the two-dimensional case, and trends also show a reduction in sonic boom signature as NPR is increased from 8 to 12. As low boom designs are developed and improved, there will be a need for understanding the interaction between the aircraft boat tail shocks and the exhaust nozzle plume. These CFD analyses will provide a baseline study for future analysis efforts.
Author
Exhaust Nozzles; Supersonic Nozzles; Plumes; Signatures; Pressure Ratio; Computational Fluid Dynamics; High Aspect Ratio; Sonic Booms

20080042060 Harrington and Smith, LLP, Shelton, CT, USA; General Electric Co., Arlington, VA, USA
Protection of Thermal Barrier Coating By an Impermeable Barrier Coating
Hazel, B. T., Inventor; Spitsberg, I., Inventor; Govern, C., Inventor; Nagaraj, B. A., Inventor; 1 Dec 04; 11 pp.; In English
Contract(s)/Grant(s): N00019-96-C-1076
Patent Info.: Filed Filed 1 Dec 04; US-Patent-Appl-SN-11-001 983
Report No.(s): PB2008-102452; No Copyright; Avail.: CASI: A03, Hardcopy

According to an embodiment of the invention, disclosed is a composite comprising a porous thermal barrier coating on a metallic part and an impermeable barrier coating adjacent to the outer surface of the thermal barrier coating. The impermeable barrier coating is dense and non-porous and comprises a rare earth silicate, the impermeable barrier coating thereby preventing infiltration of the contaminant composition into the thermal barrier coating.
NTIS
Patent Applications; Porosity; Protection; Protective Coatings; Thermal Control Coatings

20080042154 Bachman and Lapointe, PC, New Haven, CT, USA; United Technologies Corp., East Hartford, CT, USA
Turbine Engine Nozzle (PAT-APPL-11-026 955)
Peters, D. W., Inventor; 31 Dec 04; 15 pp.; In English
Contract(s)/Grant(s): N00019-02-C-3003
Patent Info.: Filed Filed 31 Dec 04; US-Patent-Appl-SN-11-026 955
Report No.(s): PB2008-104512; No Copyright; Avail.: CASI: A03, Hardcopy

A turbine engine nozzle assembly has an upstream flap and a downstream flap pivotally coupled thereto for relative

rotation about a hinge axis. An actuator linkage is coupled to the flaps for actuating the nozzle between a number of throat area conditions. First and second mode struts respectively restrict rotation of the downstream flap in first and second directions.
NTIS
Actuators; Gas Turbine Engines; Linkages; Patent Applications; Turbine Engines

20080042303 NASA Dryden Flight Research Center, Edwards, CA, USA
Data Turbine Activities at NASA
Freudinger, Lawrence C.; October 07, 2008; 7 pp.; In English; 1st Workshop of the Open Source Data Turbine Initiative, 7 Oct. 2008, La Jolla, CA, USA; Original contains color illustrations; No Copyright; Avail.: CASI: A02, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080042303

Mission Support Features: a) Shirtsleeve environment, . 18 scientists; b) worldwide deployment experience; c) Extensive modifications to support in-situ and remote sensing instruments 1) zenith and nadir viewports; 2) modified power systems; 3) 19 inch rack mounting; 4) on-board data acquisition network.
Derived from text
Data Acquisition; Zenith; Remote Sensing; Deployment

20080042324 Armstrong Teasdale, LLP, Saint Louis, MO, USA; General Electric Co., Schenectady, NY, USA
Method and Apparatus for Assessing Gas Turbine Acceleration Capability
Ashby, M. J., Inventor; Bennett, G. W., Inventor; 14 Dec 04; 7 pp.; In English
Contract(s)/Grant(s): MDA 972-98-3-002
Patent Info.: Filed Filed 14 Dec 04; US-Patent-Appl-SN-11-011 308
Report No.(s): PB2008-104304; No Copyright; Avail.: CASI: A02, Hardcopy

A method for monitoring performance of a gas turbine engine includes, during acceleration of an engine, accumulating regulator indices from an engine controller and times accumulated on acceleration regulators. At least one engine sensor value is also monitored after reaching a steady state takeoff power. The regulator indices, accumulated times, and the one or more monitored engine sensor values are used in a regression equation to normalize current engine regulator usage to a reference condition. The method further includes comparing the normalized current engine regulator usage to a historical value of engine regulator usage derived from prior takeoff data, and utilizing results of the comparison to indicate whether to perform proactive maintenance on the engine.
NTIS
Gas Turbine Engines; Gas Turbines; Patent Applications; Regulators

08
AIRCRAFT STABILITY AND CONTROL

Includes flight dynamics, aircraft handling qualities, piloting, flight controls, and autopilots. For related information see also 05 Aircraft Design, Testing and Performance; and 06 Avionics and Aircraft Instrumentation.

20080042275 NASA Langley Research Center, Hampton, VA, USA
Using Simulation Speeds to Differentiate Controller Interface Concepts
Trujillo, Anna; Pope, Alan; September 22, 2008; 5 pp.; In English; HFES 2008: Human Factors and Ergonomics Society 52nd Annual Meeting, 22-26 Sep. 2008, New York City, NY, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 457280.02.07.07.03; No Copyright; Avail.: CASI: A01, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080042275

This study investigated two concepts: (1) whether speeding a human-in-the-loop simulation (or the subject's 'world') scales time stress in such a way as to cause primary task performance to reveal workload differences between experimental conditions and (2) whether using natural hand motions to control the attitude of an aircraft makes controlling the aircraft easier and more intuitive. This was accomplished by having pilots and non-pilots make altitude and heading changes using three different control inceptors at three simulation speeds. Results indicate that simulation speed does affect workload and controllability. The bank and pitch angle error was affected by simulation speed but not by a simulation speed by controller type interaction; this may have been due to the relatively easy flying task. Results also indicate that pilots could control the bank and pitch angle of an aircraft about equally as well with the glove as with the sidestick. Non-pilots approached the pilots ability to control the bank and pitch angle of an aircraft using the positional glove - where the hand angle is directly proportional to the commanded aircraft angle. Therefore, (1) changing the simulation speed lends itself to objectively indexing

a subject s workload and may also aid in differentiating among interface concepts based upon performance if the task being studied is sufficiently challenging and (2) using natural body movements to mimic the movement of an airplane for attitude control is feasible.
Author
Control Simulation; Human Performance; Workloads (Psychophysiology); Aircraft Control; Attitude Control; Pitch (Inclination); Angular Distribution

09
RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, runways, hangars, and aircraft repair and overhaul facilities; wind tunnels, water tunnels, and shock tubes; flight simulators; and aircraft engine test stands. Also includes airport ground equipment and systems. For airport ground operations see *03 Air Transportation and Safety*. For astronautical facilities see *14 Ground Support Systems and Facilities (Space)*.

20080041236 RAND Corp., Santa Monica, CA USA
Options for Meeting the Maintenance Demands of Active Associate Flying Units
Drew, John G; Lynch, Kristin F; Masters, James M; Tripp, Robert S; Roll, Jr, Charles R; Jan 2008; 96 pp.; In English
Contract(s)/Grant(s): F49642-01-C-0003; FA7014-06-C-0001
Report No.(s): AD-A483416; No Copyright; Avail.: Defense Technical Information Center (DTIC)

As the Air Force faces end strength reductions and force structure changes, it becomes more difficult to support the AEF construct using current force employment practices. To meet congressionally mandated end strength ceilings, the Air Force must eliminate approximately 40,000 active duty personnel in the next several years, without sacrificing operational capabilities. If the Air Force desires to keep pilot production at or near 1,000 pilots per year, alternative organizational structures and resource utilization need to be considered. One of these alternative solution is to use associate units of the highly experience ANG workforce and the increased PAA per ANG unit (as a result of the QDR and BRAC decisions) to relieve some of the burden of active component pilot training. With that goal in mind, PAF was asked by senior leaders, both in the ANG and on the Air Staff, to evaluate associate unit maintenance organizations, which could be used to train junior maintenance personnel and to help relieve the burden of active component pilot training.
DTIC
Maintenance; Military Operations

20080041810 Army Engineer Research and Development Center, Vicksburg, MS USA
A Rapid Soils Analysis Kit
Berney IV, Ernest S; Wahl, Ronald E; Mar 2008; 117 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484159; ERDC/GSL-TR-08-3; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The ability to determine the construction requirements for soil without the need to conduct laboratory testing is essential to performing a contingency design. Until now, only subjective field analysis techniques satisfied this requirement, and their results fail to provide tangible numeric data that can be used to determine moisture-density and California bearing ratio (CBR) design criteria. This report describes the rapid soils analysis kit (RSAK) developed during the period November 2003-May 2007 under the Joint Rapid Airfield Construction Program. The RSAK includes compact field test instruments that are easily transported to provide an immediate measure of soil moisture, grain size distribution (GSD), and plastic limit. An accompanying software program incorporates the numeric data generated from the soils kit, classifies the soil, and uses multiple regression routines based on a statistical analysis of a large database of soil properties to predict optimum moisture content and maximum dry density for the soil of interest. Built-in, higher order regression equations allow the user to visualize complete moisture-density curves for varying compaction energies as well as soaked and unsoaked CBR as functions of water content for the constructed condition of the soil. The moisture-density curve and CBR strength represent the critical data necessary to enable contingency design and construction of highways and airfields.
DTIC
Airports; Computer Programs; Field Tests; Kits; Landing Sites; Soils

13
ASTRODYNAMICS

Includes powered and free flight trajectories; orbital and launching dynamics.

20080041108 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Crew Exploration Vehicle (CEV) Skip Entry Trajectory
Kaya, Emre; Mar 2008; 119 pp.; In English
Report No.(s): AD-A483248; AFIT/GSS/ENY/08-M06; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483248

This research effort develops a program using MATLAB (trademark) to solve the equations of motion for the atmospheric reentry of the Crew Exploration Vehicle (CEV), which is assumed to be in the phase of a lunar return trajectory that could be initiated any time during the mission. The essential reason for this research is to find a solution for the problem of an unplanned lunar return in addition to the normal procedures. Unlike Apollo-type missions, the CEV would still be able to land on any preplanned available landing site without any additional delay. In Apollo-type missions, the return phase had to be initiated in a restricted time window so that the crew module could enter the atmosphere at the preplanned time and be able to land at the planned landing site. Using skip entry procedures, landing location and time will be more accurate in addition to having the time flexibility for reentry. This MATLAB (trademark) program is designed to find the reentry parameters for given landing location according to the current alignment of the moon using a lunar return speed including the atmospheric trajectory of the CEV.
DTIC
Atmospheric Entry; Computer Programs; Equations of Motion; Lunar Trajectories; Manned Spacecraft; Reentry Vehicles; Spacecraft Trajectories; Terminal Guidance; Trajectories

14
GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and test chambers and simulators. Also includes extraterrestrial bases and supporting equipment. For related information see also *09 Research and Support Facilities (Air)*.

20080041559 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Advancing NASA's Satellite Control Capabilities: More than Just Better Technology
Smith, Danford; February 22, 2008; 21 pp.; In English; Original contains black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041559

This viewgraph presentation reviews the work of the Goddard Mission Services Evolution Center (GMSEC) in the development of the NASA's satellite control capabilities. The purpose of the presentation is to provide a quick overview of NASA's Goddard Space Flight Center and our approach to coordinating the ground system resources and development activities across many different missions. NASA Goddard's work in developing and managing the current and future space exploration missions is highlighted. The GMSEC, was established to to coordinate ground and flight data systems development and services, to create a new standard ground system for many missions and to reflect the reality that business reengineering and mindset were just as important.
CASI
Data Systems; NASA Programs; Technology Utilization; Systems Engineering; Aerospace Systems; Flight Management Systems; Research and Development

15
LAUNCH VEHICLES AND LAUNCH OPERATIONS

Includes all classes of launch vehicles, launch/space vehicle systems, and boosters; and launch operations. For related information see also *18 Spacecraft Design, Testing and Performance*; and *20 Spacecraft Propulsion and Power*.

20080041242 Naval Observatory, Washington, DC USA
Evaluation of Carrier-Phase GNSS Timing Receivers for UTC/TAI Applications
Fonville, Blair; Powers, Edward; Kropp, Anton; Vannicola, Francine; Nov 2007; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483441; No Copyright; Avail.: Defense Technical Information Center (DTIC)

USNO evaluated several carrier-phase GNSS timing receivers to determine their suitability to support UTC/TAI applications. These receivers were subjected to thermal testing, power cycle retrace testing, and long-term stability evaluation. The goal is to identify candidate replacement receivers for the USNO to be used for UTC/TAI applications, including the common-view technique for both GPS and GLONASS monitoring. Test results are reported in this paper.
DTIC
Satellite Networks; Timing Devices

20080041338 Aerospace Corp., El Segundo, CA USA
LEO Orbit Surface Charging and Its Relationship to Environment, Vehicle Geometry, and Ionospheric Conditions
Fennell, Joseph F; Anderson, Phillip C; Jun 5, 2008; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8802-04-C-0001
Report No.(s): AD-A483672; TR-2008(8570)-2; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Ungrounded surface materials on the exterior of low-to-medium altitude and medium-to-high inclination satellites can become charged in the auroral electron environment at high latitudes. The orientation of such surfaces will present different aspects relative to the satellite sun line and the satellite velocity vector. Such surfaces can be both in shadow and in the satellite wake at the same time, which enhances the chances of charging in the dusk to pre-noon sector of the auroral oval, depending on plasma density and lighting conditions at file satellite altitude and inclination. It is recommended that all surfaces be conductors if surface charging and associated electrostatic discharge (ESD) are to be avoided. Otherwise, the satellite system should be designed to tolerate the surface ESD that will occur.
DTIC
Artificial Satellites; Low Earth Orbits; Spacecraft Charging

20080041598 NASA Langley Research Center, Hampton, VA, USA
Leak Detection and Location Technology Assessment for Aerospace Applications
Wilson, William C.; Coffey, Neil C.; Madaras, Eric I.; September 2008; 27 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 401769.06.03.04.12
Report No.(s): NASA/TM-2008-215347; L-19515; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041598

Micro Meteoroid and Orbital Debris (MMOD) and other impacts can cause leaks in the International Space Station and other aerospace vehicles. The early detection and location of leaks is paramount to astronaut safety. Therefore this document surveys the state of the art in leak detection and location technology for aerospace vehicles.
Author
Leakage; Detection; Space Debris; Meteoroids; Aerospace Vehicles; Aerospace Engineering; Safety

20080041635 European Space Agency. Ulysses Office, Pasadena, CA USA
Giove-A Apparent Clock Assessment and Results
Hahn, Joerg H; Gonzalez, Francisco; Waller, Pierre; Navarro-Reyes, Daniel; Piriz, Ricardo; Mozo, Alvaro; Fernandez, Virginia; Cueto, Marta; Tavella, Patrizia; Sesia, Ilaria; Nov 2007; 21 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483828; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483828

The performance of the Galileo space-borne clocks is of importance for navigation and integrity at the corresponding user level. Clock estimation and prediction errors are directly mapped into the User Equivalent Range Error (UERE). The clock

quality also affects the integrity performance of the Galileo system: clock 'feared events,' such as frequency and phase jumps, have to be characterized and adequate barriers built against them. In addition, the clocks operate in the harsh MEO-orbit radiation environment, and performance has to be guaranteed in all satellite mission phases, including eclipses. Two Rubidium Atomic Frequency Standard (RAFS) units developed by Spectratime (former Temextime) were launched on the first experimental Galileo satellite, the Galileo In-Orbit Validation Element A (GIOVE-A). The RAFS already demonstrated excellent performance during on-ground qualification and acceptance tests. To verify its performance onboard, an experiment was carried out as part of the GIOVE Mission Segment. Under this Mission, an infrastructure was deployed, including a network of 13 Galileo Experimental Sensor Stations (GESS) monitoring continuously the GIOVE-A signals. Using dedicated network adjustment techniques, the processing of these observables allows the restitution of the phase difference between the onboard clock and a ground reference. Such restitution, however, is affected by the noise of the measurement system (e.g., onboard and averaged on-ground group delays, etc.), therefore the 'apparent' clock denomination. This paper will present the GIOVE-A apparent clock results obtained since the ground infrastructure became operational for both the nominal and the redundant onboard clocks and for various signal configurations. These results will be complemented by relevant onboard telemetry data. Finally, the assessment of the onboard clock performance will be discussed, together with the contribution of the measurement system noise.
DTIC
Atomic Clocks; Clocks; Errors; Navigation Satellites

20080041643 Naval Research Lab., Washington, DC USA
Space Clocks - Why They're Different
White, Joe; Beard, Ronald; Jan 2002; 12 pp.; In English
Report No.(s): AD-A483840; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483840

Atomic clocks for use in operational satellites such as GPS and MILSTAR are a breed apart from their terrestrial cousins. Like most space electronic packages, clocks will seem to be a generation behind the technology used in other applications. The reasons for this include the need for high reliability parts, radiation hardness, and mechanical design. Other key drivers in the designs include zero gravity, unattended operation, limited monitoring bandwidth, and limits on weight size and power. Clocks used in short-term space experiments can be closer in design to ground clocks, but are generally not usable for operational systems without extensive modifications.
DTIC
Aerospace Engineering; Artificial Satellites; Atomic Clocks; Clocks

20080041657 Academia Sinica, Shaanxi, China
Impact of Satellite Motion on the Asia-Pacific TWSTFT Links
Sun, Hongwei; Li, Zhigang; Li, Huanxin; Aug 2005; 4 pp.; In English
Report No.(s): AD-A483865; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483865

Impact of satellite motion on the Asia-Pacific TWSTFT links are analyzed and calculated. Based on the satellite motion, three aspects, which are the different distances from two stations to the satellite, time synchronization error in stations, and the Sagnac effect, result in the non-reciprocal path affecting the TWSTFT accuracy.
DTIC
Accuracy; Artificial Satellites; Asia; Motion; Time Signals

20080041859 Air Univ., Maxwell AFB, AL USA
GPS and Galileo: Friendly Foes?
Constantine, Roftiel; May 2008; 84 pp.; In English
Report No.(s): AD-A484265; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In 'GPS and Galileo: Friendly Foes?,' Lt. Col. Roftiel Constantine, USAF, analyzes the heated competition to provide service from high in the skies of medium earth orbit. The European Union (EU) is developing Galileo, its own global positioning and navigation satellite system, scheduled to be operational by 2010. The EU states that Galileo will provide greater precision to all users than is currently available from the USA' global positioning system (GPS) through improved coverage of satellite signals at higher latitudes, and, unlike GPS, Galileo is guaranteed to be always available -- even during war or political disagreement. Regarding the enormous importance of GPS to the USA and millions of users worldwide, the

prospect of a second, competing, and potentially interfering global satellite navigation system could have serious military, foreign policy, and industrial implications. The U.S. Government would benefit from the heightened awareness of the risks and opportunities the author presents for the USA surrounding the Galileo program. This monograph highlights the effects the emergence of the Galileo system will have on the transatlantic alliance, the North Atlantic Treaty Organization (NATO), U.S. dominance in the defense and security of Europe, and several serious commercial and industrial concerns. In addition, it discusses China's heavy involvement in the Galileo project and the national security dilemma this presents for the USA. Five distinct actions by the U.S. Government are necessary to protect its industrial, military, and national security interests: acknowledge the existing situation; ensure fair competition for satellite navigation hardware manufacturers; compel allied militaries to adopt GPS now; drive home the fact that, counter to European claims, the availability and precision of GPS will be on par with or better than Galileo; and secure China's cooperation in satellite navigation.
DTIC
Competition; Galileo Spacecraft; Global Positioning System; Navigation Satellites; Security; United States

20080041870 General Accounting Office, Washington, DC USA
Defense Space Activities. DOD Needs to Further Clarify the Operationally Responsive Space Concept and Plan to Integrate and Support Future Satellites
D'Agostino, Davi M; Jul 2008; 33 pp.; In English
Report No.(s): AD-A484300; GAO-08-831; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Department of Defense's (DOD) operational dependence on space has placed new and increasing demands on current space systems to meet commanders needs. DOD's Operationally Responsive Space (ORS) concept is designed to more rapidly satisfy commanders' needs for information and intelligence during ongoing operations. Given the potential for ORS to change how DOD acquires and fields space capabilities to support the warfighter, this report discusses to what extent DOD (1) is developing ORS to support warfighter requirements and (2) has a plan that integrates ORS into existing DOD and intelligence community processes and architecture. GAO reviewed and analyzed ORS planning documents, the ORS concept of operations, and processes for meeting warfighter needs and also interviewed defense and intelligence community officials who are involved with the ORS concept. GAO recommends that (1) DOD define ORS key terms, how timely satisfaction of a need is evaluated, and what Joint Force Commander needs the ORS concept is trying to satisfy; (2) establish an ongoing communications and outreach approach for ORS; and (3) identify the steps necessary to ensure the integration of the ORS concept into existing DOD and intelligence community processes and architecture. DOD partially concurred with our recommendations.
DTIC
Aerospace Systems; Defense Program; Intelligence; Military Operations; Planning

20080042043 Cornell Univ., Ithaca, NY USA
Mission Support for the Communication/Navigation Outage Forecast System (C/NOFS) Satellite
Hysell, David L; Nov 21, 2007; 23 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F19628-03-C-0067; Proj-1010
Report No.(s): AD-A483600; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Cornell University supported the Air Force Research Laboratory C/NOFS mission through a combination of experiment development, data acquisition and processing, simulation, and modeling of ionospheric processes pertinent to forecasting so-called equatorial spread F phenomena. A new radar mode capable of providing simultaneous plasma density and drift measurements in the equatorial ionosphere has been developed and implemented at the Jicamarca Radio Observatory. The new mode will be crucial for C/NOFS calibration/validation as well as for ongoing campaign Support. Data acquired in this and other modes have been taken at Jicamarca in support of DMSP and COSMIC satellite overflights. Processed parameters have been posted and distributed to the C/NOFS science team through the Madrigal distributed data server. These data can also be used to test and initialize the AFRL forecast models. Additional experimental runs will be performed throughout the actual C/NOFS mission. Three specific investigations were carried out during the Cornell award period An improved ionospheric irregularity forecast strategy based on an evolving understanding of a counter streaming plasma instability process has been formulated. The new strategy should outperform traditional ones based solely on Rayleigh Taylor-type instability mechanisms. A new long-pulse incoherent scatter radar data processing scheme has been developed for improved measurement of plasma density, temperature, and composition profiles in the topside ionosphere. The new mode will be particularly useful right after C/NOFS launch, which will occur near solar minimum. A new means of inverting satellite radio occultation data has been

developed and demonstrated. The method reflects artifacts that would otherwise obscure the E and valley regions and will increase the usefulness of beacon data from C/NOFS.
DTIC
Communication Satellites; Forecasting; Navigation; Radar

16
SPACE TRANSPORTATION AND SAFETY

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques. For related information see also *03 Air Transportation and Safety; 15 Launch Vehicles and Launch Operations*; and *18 Spacecraft Design, Testing and Performance*. For space suits see *54 Man/System Technology and Life Support*.

20080041543 NASA Johnson Space Center, Houston, TX, USA
Quo Vadis Payload Safety?
Fodroci, Michael P.; Schwartz, MaryBeth; October 21, 2008; 14 pp.; In English; Building A Safety Space Together, 21-23 Oct. 2008, Rome, Italy; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041543

As we complete the preparations for the fourth Hubble Space Telescope (HST) servicing mission, we note an anniversary approaching: it was 30 years ago in July that the first HST payload safety review panel meeting was held. This, in turn, was just over a year after the very first payload safety review, a Phase 0 review for the Tracking and Data Relay Satellite and its Inertial Upper Stage, held in June of 1977. In adapting a process that had been used in the review and certification of earlier Skylab payloads, National Aeronautics and Space Administration (NASA) engineers sought to preserve the lessons learned in the development of technical payload safety requirements, while creating a new process that would serve the very different needs of the new space shuttle program. Their success in this undertaking is substantiated by the fact that this process and these requirements have proven to be remarkably robust, flexible, and adaptable. Furthermore, the payload safety process has, to date, served us well in the critical mission of safeguarding our astronauts, cosmonauts, and spaceflight participants. Both the technical requirements and their interpretation, as well as the associated process requirements have grown, evolved, been streamlined, and have been adapted to fit multiple programs, including the International Space Station (ISS) program, the Shuttle/Mir program, and most recently the USA Constellation program. From its earliest days, it was anticipated that the payload safety process would be international in scope, and so it has been. European Space Agency (ESA), Japan Aerospace Exploration Agency (JAXA), German Space Agency (DLR), Canadian Space Agency (CSA), Russian Space Agency (RSA), and many additional countries have flown payloads on both the space shuttle and on the ISS. Our close cooperation and long-term working relationships have culminated in the franchising of the payload safety review process itself to our partners in ESA, which in turn will serve as a roadmap for extending the franchise to other Partners.
Author
Hubble Space Telescope; Payloads; Consumables (Spacecraft); Cargo; Safety; Reliability; NASA Programs; Astronauts; Constellation Program

20080042402 NASA Johnson Space Center, Houston, TX, USA
Building on the Past - Looking to the Future: A Focus on Payload Safety
Nash, Sally K.; Rehm, Raymond B.; Samtoagp. Darren M.; Wong, Teresa K.; Wolf, Scott L.; October 21, 2008; 22 pp.; In English; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

The history of the space industry stretches far and above lunar landings to the construction of the International Space Station. For years, humans have sought to understand the nature of the universe. As society grows in knowledge and curiosity of space, the focus of maintaining the safety of the crew and vehicle habitability is of utmost importance to the National Aeronautics and Space Administration (NASA) community. Through the years, Payload Safety has developed not only as a Panel, but also as part of the NASA community, striving to enhance the efficiency and understanding of how business should be conducted as more International Partners become involved. This is the first in a series of papers and presentations in what is hoped to be an annual update that provides continuous challenges and lessons learned in the areas of communication, safety requirements and processes and other areas which have been vital to the Payload Safety Review Panel (PSRP).
Author
NASA Programs; Payloads; International Space Station; Lessons Learned; Safety; Habitability; Lunar Landing

20080042413 NASA Langley Research Center, Hampton, VA, USA

Simulated Reentry Heating by Torching

Harvey, Gale A.; October 20, 2008; 10 pp.; In English; 25th Space Simulation Conference, 20-23 Oct. 2008, Annapolis, MD, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 092837.04.01.04.07.04; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080042413

The two first order reentry heating parameters are peak heating flux (W/cm2) and peak heat load (kJ/cm2). Peak heating flux (and deceleration, gs) is higher for a ballistic reentry and peak heat load is higher for a lifting reentry. Manned vehicle reentries are generally lifting reentries at nominal 1-5 gs so that personnel will not be crushed by high deceleration force. A few off-nominal manned reentries have experienced 8 or more gs with corresponding high heating flux (but below nominal heat load). The Shuttle Orbiter reentries provide about an order of magnitude difference in peak heating flux at mid-bottom (TPS tiles, approximately 6 W/cm2 or 5 BTU/ft2- sec) and leading edge (RCC, approximately 60 W/cm2 or 50 BTU/ft2- sec). Orion lunar return and Mars sample lander are of the same order of magnitude as orbiter leading edge peak heat loads. Flight temperature measurements are available for some orbiter TPS tile and RCC locations. Return-to-Flight on-orbit tile-repair-candidate-material-heating performance was evaluated by matching propane torch heating of candidate-materials temperatures at several depths to orbiter TPS tile flight-temperatures. Char and ash characteristics, heat expansion, and temperature histories at several depths of the cure-in-place ablator were some of the TPS repair material performance characteristics measured. The final char surface was above the initial surface for the primary candidate (silicone based) material, in contrast to a receded surface for the Apollo-type ablative heat shield material. Candidate TPS materials for Orion CEV (LEO and lunar return), and for Mars sample lander are now being evaluated. Torching of a candidate ablator material, PICA, was performed to match the ablation experienced by the STARDUST PICA heat shield. Torching showed that the carbon fiberform skeleton in a sample of PICA was inhomogeneous in that sample, and allowed measurements (of the clumps and voids) of the inhomogeneity. Additional reentry heating-performance characterizations of high temperature insulation materials were performed.

Author

Crew Exploration Vehicle; Spacecraft Reentry; High Temperature Environments; Atmospheric Entry Simulation; Torches; Reentry Shielding; Spacecraft Shielding; Thermal Protection

17
SPACE COMMUNICATIONS, SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes space systems telemetry; space communications networks; astronavigation and guidance; and spacecraft radio blackout. For related information see also *04 Aircraft Communications and Navigation*; and *32 Communications and Radar*.

20080040876 NASA Goddard Space Flight Center, Greenbelt, MD, USA; NASA Goddard Space Flight Center, Greenbelt, MD, USA

Guidance, Navigation and Control (GN&C): Best Practices for Human-Rated Spacecraft Systems

Lebsock, Ken; West, John; February 26, 2008; 39 pp.; In English; Fifth Annual NASA Project Management Challenge 2008, 26 - 27 Feb. 2008, Daytona Beach, Florida, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

In 2007 the NESC completed an in-depth assessment to identify, define and document engineering considerations for the Design Development Test and Evaluation (DDT&E) of human-rated spacecraft systems. This study had been requested by the Astronaut Office at JSC to help them to better understand what is required to ensure safe, robust, and reliable human-rated spacecraft systems. The 22 GN&C engineering Best Practices described in this paper are a condensed version of what appears in the NESC Technical Report. These Best Practices cover a broad range from fundamental system architectural considerations to more specific aspects (e.g., stability margin recommendations) of GN&C system design and development. 15 of the Best Practices address the early phases of a GN&C System development project and the remaining 7 deal with the later phases. Some of these Best Practices will cross-over between both phases. We recognize that this set of GN&C Best Practices will not be universally applicable to all projects and mission applications.

Derived from text

Aerospace Engineering; Procedures; Systems Engineering; Spacecraft Guidance; Space Navigation; Computer Systems Design; Manned Space Flight

20080040954 Tokyo Metropolitan Univ., Tokyo, Japan

The Shortest Way in Space

Fujii, Hironori A.; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 7 pp.; In English; See also 20080040944; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The shortest way is studied in this paper to move a space structure on an orbit from one place to another one in effect of both of the central and rotational force fields. The shortest path in space is shown to be any curve, which changes as the velocity of the movement changes due to the Coriolis effect. The Coriolis force, the double of the movement velocity multiplied by the rotational velocity, drives the way of movement to curve from the straight line and is defined as control force acting on the motion. The metric of the motion is employed to measure the length of the movement path and its integral is defined as the total length of the trajectory. The problem of finding the shortest way is formulated as the optimal control problem with defining the Coriolis force and the length of the trajectory as the control force and the performance index, respectively. Through employment of the techniques of the analytical mechanics the problem system is reduced to a two-point boundary-value problem to be analyzed numerically. Results of the numerical analysis are compared with a result of an analysis employed with the usual feedback control and the performance is examined on the property of the shortest way in space.

Author

Coriolis Effect; Field Theory (Physics); Rotation; Spacecraft Trajectories; Interorbital Trajectories

20080041901 Timing Solutions Corp., Boulder, CO USA

Modernized LORAN-C Timing Test Bed Status and Results

Celano, Tom; Biggs, Casey; Peterson, Benjamin; Shmihluk, Kevin; Aug 2005; 7 pp.; In English; Original contains color illustrations

Report No.(s): AD-A484374; No Copyright; Avail.: Defense Technical Information Center (DTIC)

LORAN-C is being examined as a viable backup to GPS for timing and navigation. Accuracy from the LORAN-C network has always been limited by variations in the propagation delay of the 100 kHz LORAN pulse. Using common-view techniques that are commonly used in GPS LORAN data can be corrected to improve timing accuracy. The USCG plans to transmit corrections in real time via a new pulse in the LORAN signal called the LORAN Data Channel 'LDC'. Initial testing was conducted using a 3 monitor network of Timing Solutions Corporation 'TSC' in Boulder CO, NIST in Boulder CO and LORAN Station Gillette WY. This provided a short baseline between TSC and NIST and a long baseline between TSC and Gillette. This setup showed that even in the long baseline, LORAN-C could be used as a precision 'sub 50 ns RMS' time recovery system in the western US. Upon completion of the proof-of-concept test in Colorado and Wyoming, a second, more extensive experiment was initiated on the east coast where greater variations in propagation delay have been historically observed. Monitors have been configured at the LORAN Support Unit in Wildwood, NJ, the USA Naval Observatory in Washington D.C. and the Naval Research Laboratory in Washington D.C. These monitors collect data that will initially be post processed in a common-view LORAN solution between the different collection points. As the test progresses, corrections from some or all of these monitors will be transmitted via the LDC and processed in real time by the network of prototype receivers. This paper will present results to date on the east coast network and provide the schedule for the testing of real time corrections via the LDC.

DTIC

Data Transmission; Global Positioning System; LORAN; LORAN C; Test Stands

20080042114 Sigtem Technology, Inc., San Mateo, CA USA

Nonlinear Filtering Techniques for GNSS Data Processing

Yang, Chun; Miller, Mikel; Jun 2005; 17 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8650-05-C-1828; Proj-3005

Report No.(s): AD-A484449; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Nonlinearities appear 'everywhere' in the signal and data processing chain of the Global Navigation Satellite System (GNSS). At the 'upper' end of the chain, ephemeris data modulated onto transmitted signals are predicted from satellite orbits whose determination is a well-known nonlinear estimation problem. At the 'lower' end, within a GNSS receiver, the satellite signal tracking, position-fixing, and even integration with other sensors, such as an inertial navigation system (INS), all involve nonlinearity issues in one form or another. Either a small signal model or linearization is presently used to deal with nonlinearity. The former includes code and carrier tracking loops and the latter includes the extended Kalman filter (EKF) for orbit determination, position solution, and GPS/INS integration among others. In this paper, we present two emerging

nonlinear filtering techniques, namely, the unscented Kalman filter (UKF) and particle filter (PF), and study their use in GNSS applications in comparison to the EKF. The UKF is also called the sigma-point Kalman filter (SPKF) and the PF has many variants in its implementation. In the EKF, both the state dynamics and measurement equations are linearized in order to apply the Kalman filter, which is only valid for linear Gaussian systems. Instead of truncating the nonlinear functions to the first order as in the EKF, the UKF and PF approximate the distribution of the state deterministically (sigma points) and randomly (particles), respectively, with a finite set of samples, and then propagate these points or particles through the exact nonlinear functions. Because the nonlinear functions are used without approximation, it is much simpler to implement and generates better results. After formulating these nonlinear filtering algorithms, this paper will illustrate their functionality and performance using satellite

DTIC

Data Processing; Global Positioning System; Navigation Satellites; Nonlinear Filters

18
SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and spacecraft control and stability characteristics. For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance; 39 Structural Mechanics*; and *16 Space Transportation and Safety*.

20080042272 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Application of Space Environmental Observations to Spacecraft Pre-Launch Engineering and Spacecraft Operations

Barth, Janet L.; Xapsos, Michael; March 17, 2008; 23 pp.; In English; GOMACTech 2008, 17-20 Mar. 2008, Las Vegas, NV, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080042272

This presentation focuses on the effects of the space environment on spacecraft systems and applying this knowledge to spacecraft pre-launch engineering and operations. Particle radiation, neutral gas particles, ultraviolet and x-rays, as well as micrometeoroids and orbital debris in the space environment have various effects on spacecraft systems, including degradation of microelectronic and optical components, physical damage, orbital decay, biasing of instrument readings, and system shutdowns. Space climate and weather must be considered during the mission life cycle (mission concept, mission planning, systems design, and launch and operations) to minimize and manage risk to both the spacecraft and its systems. A space environment model for use in the mission life cycle is presented.

Author

Aerospace Environments; Environment Models; Spacecraft Design; Systems Engineering; Spacecraft Shielding; Astrionics

20080042304 NASA Johnson Space Center, Houston, TX, USA

Apollo 13 Case Study Part 1 and 2

Iterbartolo, Michael; [2008]; 70 pp.; In English; Apollo 13 Blu Ray DVD to be available January 2009; Original contains color illustrations; No Copyright; Avail.: CASI: A04, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080042304

Objectives: a) Describe the Service Module Electrical Power System hardware; b) Describe the circumstances which led to the Apollo 13 accident c) Summarize the Mission Control and crew reaction.

Derived from text

Command Service Modules; Electric Batteries; Fuel Cells; Cryogenics; Lunar Module; Loads (Forces); Heaters

20080042309 NASA Langley Research Center, Hampton, VA, USA

Ares I-X Flight Test Vehicle Similitude to the Ares I Crew Launch Vehicle

Huebner, Lawrence D.; Smith, R. Marshall; Campbell, John R., Jr.; Taylor, Terry L.; September 29, 2008; 12 pp.; In English; 59th International Astronautical Congress, 29 Sep. - 3 Oct. 2008, Glasgow, UK; Original contains color illustrations

Contract(s)/Grant(s): WBS 136905.10.10.20.20

Report No.(s): IAC-08-D2.6.7; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080042309

The Ares I-X Flight Test Vehicle is the first in a series of flight test vehicles that will take the Ares I Crew Launch Vehicle design from development to operational capability. The test flight is scheduled for April 2009, relatively early in the Ares I

design process so that data obtained from the flight can impact the design of Ares I before its Critical Design Review. Because of the short time frame (relative to new launch vehicle development) before the Ares I-X flight, decisions about the flight test vehicle design had to be made in order to complete analysis and testing in time to manufacture the Ares I-X vehicle hardware elements. This paper describes the similarities and differences between the Ares I-X Flight Test Vehicle and the Ares I Crew Launch Vehicle. Areas of comparison include the outer mold line geometry, aerosciences, trajectory, structural modes, flight control architecture, separation sequence, and relevant element differences. Most of the outer mold line differences present between Ares I and Ares I-X are minor and will not have a significant effect on overall vehicle performance. The most significant impacts are related to the geometric differences in Orion Crew Exploration Vehicle at the forward end of the stack. These physical differences will cause differences in the flow physics in these areas. Even with these differences, the Ares I-X flight test is poised to meet all five primary objectives and six secondary objectives. Knowledge of what the Ares I-X flight test will provide in similitude to Ares I as well as what the test will not provide is important in the continued execution of the Ares I-X mission leading to its flight and the continued design and development of Ares I.
Author
Flight Test Vehicles; Ares 1 Launch Vehicle; Comparison; Spacecraft Design; Design Analysis; Research and Development

19
SPACECRAFT INSTRUMENTATION AND ASTRIONICS

Includes the design, manufacture, or use of devices for the purpose of measuring, detecting, controlling, computing, recording, or processing data related to the operation of space vehicles or platforms. For related information see also *06 Avionics and Aircraft Instrumentation*; for spaceborne instruments not integral to the vehicle itself see *35 Instrumentation and Photography*; for spaceborne telescopes and other astronomical instruments see *89 Astronomy*.

20080042285 NASA Langley Research Center, Hampton, VA, USA
Synthetic Vision Displays for Planetary and Lunar Lander Vehicles
Arthur, Jarvis J., III; Prinzel, Lawrence J., III; Williams, Steven P.; Shelton, Kevin J.; Kramer, Lynda J.; Bailey, Randall E.; Norman, Robert M.; August 22, 2008; 5 pp.; In English; HFES 2008: Human Factors and Ergonomics Society 52nd Annual Meeting, 22-26 Sep. 2008, New York City, NY, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 609866.02.07.07.02; Copyright; Avail.: CASI: A01, Hardcopy

Aviation research has demonstrated that Synthetic Vision (SV) technology can substantially enhance situation awareness, reduce pilot workload, improve aviation safety, and promote flight path control precision. SV, and related flight deck technologies are currently being extended for application in planetary exploration vehicles. SV, in particular, holds significant potential for many planetary missions since the SV presentation provides a computer-generated view for the flight crew of the terrain and other significant environmental characteristics independent of the outside visibility conditions, window locations, or vehicle attributes. SV allows unconstrained control of the computer-generated scene lighting, terrain coloring, and virtual camera angles which may provide invaluable visual cues to pilots/astronauts, not available from other vision technologies. In addition, important vehicle state information may be conformally displayed on the view such as forward and down velocities, altitude, and fuel remaining to enhance trajectory control and vehicle system status. The paper accompanies a conference demonstration that introduced a prototype NASA Synthetic Vision system for lunar lander spacecraft. The paper will describe technical challenges and potential solutions to SV applications for the lunar landing mission, including the requirements for high-resolution lunar terrain maps, accurate positioning and orientation, and lunar cockpit display concepts to support projected mission challenges.
Author
Display Devices; Lunar Landing; Aircraft Safety; Enhanced Vision; Flight Safety; Lunar Maps; Trajectory Control; Visual Stimuli; High Resolution

20080042287 NASA Langley Research Center, Hampton, VA, USA
Testing the Efficacy of Synthetic Vision during Non-Normal Operations as an Enabling Technology for Equivalent Visual Operations
Kramer, Lynda J.; Williams, Steven P.; September 22, 2008; 6 pp.; In English; HFES 2008: Human Factors and Ergonomics Society 52nd Annual Meeting, 22-26 Sep. 2008, New York City, NY, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 609866.02.07.07.02; No Copyright; Avail.: CASI: A02, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080042287

Synthetic Vision (SV) may serve as a revolutionary crew/vehicle interface enabling technology to meet the challenges of

the Next Generation Air Transportation System Equivalent Visual Operations (EVO) concept that is, the ability to achieve or even improve on the safety of Visual Flight Rules (VFR) operations, maintain the operational tempos of VFR, and potentially retain VFR procedures independent of actual weather and visibility conditions. One significant challenge lies in the definition of required equipage on the aircraft and on the airport to enable the EVO concept objective. An experiment was conducted to evaluate the effects of the presence or absence of SV, the location (head-up or head-down) of this information during an instrument approach, and the type of airport lighting information on landing minima. Another key element of the testing entailed investigating the pilot s awareness and reaction to non-normal events (i.e., failure conditions) that were unexpectedly introduced into the experiment. These non-normals are critical determinants in the underlying safety of all-weather operations. This paper presents the experimental results specific to pilot response to non-normal events using head-up and head-down synthetic vision displays.
Author
Display Devices; Enhanced Vision; Instrument Approach; Safety; Visibility; Air Transportation

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SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources. For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 15 Launch Vehicles and Launch Operations*, and *44 Energy Production and Conversion*.

20080040947 Shri Guru Gobind Singhji Inst. of Engineering and Technology, India
Engineering Vacuum using High Density Packets of Electrons for Space Flight Applications
Tiwari, Shrigovind; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 8 pp.; In English; See also 20080040944; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Electromagnetic zero point vacuum fluctuations manifest themselves in the form of Casimir effect. This effect also exists for electrons immersed in the sea of background electromagnetic vacuum fluctuations. At shortening distances the Casimir force can overpower coulomb s force of repulsion resulting in the electrons being finally attracted towards each other. These electrons under the balanced interaction of Casimir forces and coulomb s force form high density stable packets of electrons that would bring an inevitable revolution space industry. The packets of electrons have a high amount of potential energy. The key to using high density packets of electrons for space flight propulsion is to tap this potential energy. The amount of potential energy contained in these packets can help propel space crafts to unimaginably high speeds being cost effective at the same time. This work involves the projected possibility that empty space itself (the quantum vacuum) might be manipulated so as to provide energy/thrust for future space vehicles. In this entire conceptualzation we would first try to understand this free energy then try to understand the formation of the packets of electrons and then the possible way of considering the viability of vacuum engineering in the form of systems based on the concept of high density charge for space flight applications.
Author
Free Energy; Electromagnetic Propulsion; Space Flight; Vacuum; Quantum Mechanics; Quantum Electrodynamics

20080042153 Ross (John H.), Del Mar, CA, USA
Rocket Nozzle Material (PAT-APPL-11-030 424)
Metcalfe, A., Inventor; Elsner, N. B., Inventor; 6 Jan 05; 16 pp.; In English
Contract(s)/Grant(s): N00167-99-C00048
Patent Info.: Filed Filed 6 Jan 05; US-Patent-Appl-SN-11-030 424
Report No.(s): PB2008-104513; No Copyright; Avail.: CASI: A03, Hardcopy

The invention is an aluminum burning rocket engine lining. The lining material is or includes one or more transition metal carbides of tantalum, niobium or vanadium. Applicants have determined that in aluminum burning rocket engines molten Al(sub 2)O(sub 3) coats the inside surface of the throat of the rocket nozzle protecting certain transition metal carbides from oxidizing reactions at temperatures below a specific temperature that applicants call the reaction initiated temperature (RIT). Applicants have proven through calculations and tests that a variety of transition metal carbide compositions as good as or better than tungsten as an engine liner material for aluminum burning rocket engines.
NTIS
Aluminum; Burners; Linings; Patent Applications; Rocket Engines; Rocket Nozzles; Textiles

23
CHEMISTRY AND MATERIALS (GENERAL)

Includes general research topics related to the composition, properties, structure, and use of chemical compounds and materials as they relate to aircraft, launch vehicles, and spacecraft. For specific topics in chemistry and materials see *categories 25 through 29*. For astrochemistry see category *90 Astrophysics*.

20080040807 Roetzel and Andress, Akron, OH, USA
Poly(Cyclosiloxane) Composition and Method of Systhesis Thereof
Kennedy, J. P., Inventor; 15 Aug 03; 13 pp.; In English
Contract(s)/Grant(s): NSF 99-88808
Patent Info.: Filed Filed 15 Aug 03; US-Patent-Appl-SN-10-525 284
Report No.(s): PB2008-103801; No Copyright; Avail.: CASI: A03, Hardcopy

A poly(cyclosiloxane) network comprises the hydrosilation reaction product of a cyclosiloxane of the formula (I) wherein R and R.sup.2 are the same or different for each siloxane moiety of hydrogen, an alkyl group, an aryl group, and a cycloalkyl group, and wherein n is an integer from 3 to 8, wherein the cyclosiloxanes are joined by moieties selected from the group consisting of oxygen atoms, linear silanols, branched silanols, halosilanes, alkoxysilanes, vinyl silanes, allyl silanes, vinyl siloxanes, and allyl siloxanes, wherein the Si--O bonds of the cyclosiloxanes are substantially unrearranged compared to the cyclosiloxane precursors of the network. A process for the preparation of a poly(cyclosiloxane) network comprises providing a cyclosiloxane; providing a crosslinking group selected from the group consisting of linear silanols, branched silanols, halosilanes, alkoxysilanes, vinyl silanes, allyl silanes, vinyl siloxanes, and allyl siloxanes; contacting the cyclosiloxane and crosslinking group under condensation reaction conditions such that the crosslinking groups provide Si--O--Si linkages between the cyclosiloxane moieties to form a poly(cyclosiloxane) network composition.
NTIS
Patent Applications; Siloxanes; Polymers; Molecular Structure; Hydrocarbons

20080040810 Dunlap, Codding and Rogers, P.C, Oklahoma, OK, USA
Polymer Grafting by Polysaccharide Synthases Using Artificial Sugar Acceptors
DeAngelis, P. L., Inventor; 19 Oct 05; 54 pp.; In English
Contract(s)/Grant(s): MCB-9876193
Patent Info.: Filed Filed 19 Oct 05; US-Patent-Appl-SN-11-253 453
Report No.(s): PB2008-103786; No Copyright; Avail.: CASI: A04, Hardcopy

The present invention relates to methodology for polymer grafting by a polysaccharide synthase and, more particularly, polymer grafting using the glycosaminoglycan synthases from Pasteurella multocida. The methodology of the present invention includes providing an enzymatically active glycosaminoglycan synthase enzyme from Pasteurella multocida, providing a synthetic, artificial acceptor for the glycosaminoglycan synthase enzyme; combining the synthetic, artificial acceptor with the glycosaminoglycan synthase enzyme within a reaction medium, wherein the reaction medium contains at least one sugar precursor selected from the group consisting of UDP-GlcA, UDP-GlcNAc, UDP-GalNAc, and reacting the glycosaminoglycan synthase enzyme with the synthetic, artificial acceptor to produce an oligosaccharide or polysaccharide polymer. The glycosaminoglycan synthase enzyme may be hyaluronan synthase, chondroitin synthase, or heparosan synthase from P. multocida, and the oligosaccharide or polysaccharide polymer may be hyaluronic acid (hyaluronan), chondroitin, heparosan, or combinations thereof.
NTIS
Acceptor Materials; Grafting; Patent Applications; Polysaccharides; Sugars

20080040846 Scott (Eddie E.), LIvermore, CA, USA; California Univ., Berkeley, CA, USA
Electronic Unit Integrated Into a Flexible Polymer Body
Krulevitch, P. A., Inventor; Maghribi, M. N., Inventor; Benett, W. J., Inventor; Hamilton, J. K., Inventor; Rose, K. A., Inventor; 5 Jan 06; 18 pp.; In English
Contract(s)/Grant(s): W-7405-ENG-48
Patent Info.: Filed Filed 5 Jan 06; US-Patent-Appl-SN-11-326 967
Report No.(s): PB2008-104364; No Copyright; Avail.: CASI: A03, Hardcopy

A peel and stick electronic system comprises a silicone body, and at least one electronic unit operatively connected to the

silicone body. The electronic system is produce by providing a silicone layer on a substrate, providing a metal layer on the silicone layer, and providing at least one electronic unit connected to the metal layer.
NTIS
Flexible Bodies; Patent Applications; Silicones

20080040897 Seagate Technology, LLC, Minneapolis, MN, USA
Head Disc Interface Design
Li, L., Inventor; Platt, C. L., Inventor; Hsia, Y. T., Inventor; 15 Nov 04; 16 pp.; In English
Contract(s)/Grant(s): 70NANB1H3056
Patent Info.: Filed Filed 15 Nov 04; US-Patent-Appl-SN-10-989 030
Report No.(s): PB2008-103869; No Copyright; Avail.: CASI: A03, Hardcopy

A recording medium for heat assisted magnetic recording includes a magnetic disc having a data zone portion and a non-data zone portion. A liquid lubricant is disposed on the non-data zone portion, and a solid lubricant disposed on the data zone portion. In one embodiment, the solid lubricant has a high thermal stability relative to the liquid lubricant.
NTIS
Lubrication; Magnetic Recording; Media; Patent Applications; Thin Films

20080040909 Brookhaven National Lab., Upton, NY USA
Method for Applying Asbestos Digestion Chemical to Asbestos-Containing Materials
Petrakis, L., Inventor; Webster, R. P., Inventor; 22 Nov 04; 9 pp.; In English
Contract(s)/Grant(s): DE-AC02-98CH10886
Patent Info.: Filed Filed 22 Nov 04; US-Patent-Appl-SN-10-993 480
Report No.(s): PB2008-104338; No Copyright; Avail.: CASI: A02, Hardcopy

A method for applying liquid, foam and/or gel forms of asbestos digestion chemicals through painted, coated or otherwise protected or encapsulated surfaces of asbestos-containing materials. The method includes forming an injection aperture in the encapsulating material and contacting the hazardous asbestos-containing material with asbestos digestion material through the injection aperture. As a result of the treatment, the asbestos digestion material converts the hazardous asbestos-containing material into non-hazardous material.
NTIS
Asbestos; Digesting; Encapsulating; Patent Applications

20080040910 Evan Law Group, LLC, Chicago, IL, USA
Multifunctional Autonomically Healing Composite Material
White, S. R., Inventor; Sottos, N. R., Inventor; Geubelle, P. H., Inventor; Moore, J. S., Inventor; Sriram, S. R., Inventor; 18 Jan 05; 8 pp.; In English
Contract(s)/Grant(s): F49620-00-1-0094/WHITE
Patent Info.: Filed Filed 18 Jan 05; US-Patent-Appl-SN-11-039 355
Report No.(s): PB2008-104337; No Copyright; Avail.: CASI: A02, Hardcopy

A composite material, contains a polymer, a polymerizer, a corresponding catalyst for the polymerizer, and a plurality of capsules. The polymerizer is in the capsules. The composite material is self-healing.
NTIS
Composite Materials; Healing; Patent Applications

20080040920 UT-Battelle, LLC, Oak Ridge, TN, USA
Method of Making an Angled Tip for a Scanning Force Microscope
Cui, H., Inventor; 3 Feb 06; 19 pp.; In English
Contract(s)/Grant(s): DE-AXC05-000R22725
Patent Info.: Filed Filed 3 Feb 06; US-Patent-Appl-SN-11-346 745
Report No.(s): PB2008-103913; No Copyright; Avail.: CASI: A03, Hardcopy

A method of making a microscope probe includes the steps of: providing a cantilever; depositing a masking layer on a surface of the cantilever; developing a deterministic spot of the masking layer; removing the deterministic spot of the masking layer from the cantilever to form a deterministic spot of exposed cantilever; depositing a layer of nanostructure-growth catalyst directly on and in contact with the cantilever at the deterministic spot of exposed cantilever; removing the masking layer from

the cantilever so that a dot of the catalyst remains on the cantilever at the deterministic spot; and growing a nanostructure at the deterministic spot.
NTIS
Patent Applications; Scanners; Scanning Electron Microscopy

20080040937 Volentine, Francos, and Whitt, PLLC, Reston, VA, USA
Polishing Process for Producing Damage Free Surfaces on Semi-Insulating Silicon Carbide Wafers
Everson, W. J., Inventor; Snyder, D., Inventor; Gamble, R., Inventor; Heydemann, V. D., Inventor; 14 Nov 05; 20 pp.; In English
Contract(s)/Grant(s): DAAD19-02-1-0231
Patent Info.: Filed Filed 14 Nov 05; US-Patent-Appl-SN-11-271 737
Report No.(s): PB2008-103816; No Copyright; Avail.: CASI: A03, Hardcopy

A polishing mixture and related method of polishing a material wafer surface, such as silicon carbide, are disclosed. The polishing mixture comprises; an abrasive and an oxidizer mixed in an acidic solution. Alumina may be used as the abrasive and the polishing mixture may have a pH less than or equal to seven (7).
NTIS
Damage; Insulation; Patent Applications; Polishing; Silicon Carbides; Wafers

20080041039 Proskauer Rose, LLP, Boston, MA, USA
Fluid-Activated Shaft Seal
Van Schoor, M. C., Inventor; 22 Nov 05; 16 pp.; In English
Contract(s)/Grant(s): N65538-04-M-0157
Patent Info.: Filed Filed 22 Nov 05; US-Patent-Appl-SN-11-286 680
Report No.(s): PB2008-103819; No Copyright; Avail.: CASI: A03, Hardcopy

Systems and methods associated with a fluid-activated shaft seal are provided. The system includes a housing and a seal disposed relative to the housing. The method reduces flow of a fluid between the shaft and the housing. The method involves installing the housing in an opening relative to the shaft and locating the seal relative to the housing. The seal includes a gel material that expands when exposed to a fluid. The seal reduces flow of the fluid through a gap between the housing and the shaft. Advantages of the system and method include reduced wear to the seal due to friction because the seal does not engage the shaft in the absence of a fluid. The seal engages the shaft in the presence of a fluid. Sealing quality is improved by increasing the pressure differential acting on the gel material. In some embodiments, the seal includes a lip portion.
NTIS
Patent Applications; Shafts (Machine Elements)

20080041312 Navy Technology Center for Safety and Survivability, Washington, DC, DC USA
Recovery of [CO2]T from Aqueous Bicarbonate using a Gas Permeable Membrane
Willauer, Heather D; Hardy, Dennis R; Lewis, M K; Ndubizu, Ejiogu C; Williams, Frederick W; Jun 25, 2008; 16 pp.; In English
Report No.(s): AD-A483621; NRL/MR/6180--08-9129; XB-NRL/MR/6180; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Celgard 2400 gas permeable membranes were in contact with a model sodium bicarbonate solution on a closed system at elevated water pressures. When gaseous carbon dioxide was removed from the water by diffusion through the membrane, the bicarbonate disproportionated to carbon dioxide and carbonate. The carbon dioxide permeance rate and effect of ionic strength on disproportionation is reported.
DTIC
Carbon Dioxide; Carbonates; Gaseous Diffusion; Membranes

20080041327 Air Force Research Lab., Edwards AFB, CA USA
Near Plume Laser Induced Fluorescence Velocity Measurements of a 600 W Hall Thruster (Preprint)
Hargus, William A; Charles, Christopher S; Jun 2, 2008; 11 pp.; In English
Contract(s)/Grant(s): Proj-2308
Report No.(s): AD-A483651; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This work presents the near exit plane velocity field of the Busek Company BHT-600-Circular 600 W Hall thruster at a

single operating condition with a 300 V anode potential. The xenon ion propellant velocities were measured using laser induced fluorescence of the 5d[4]7/2 - 6p[3] 5/2 excited state xenon ionic transition at 834.72 nm. Ion velocities were interrogated from the acceleration channel exit plane to a distance 100 mm from the exit plane (1.6 exit plane diameters). Both axial and radial velocities were directly measured. A nearly uniform axial velocity profile of approximately 17,000 m/s (197 eV) was measured at the acceleration channel center on the exit plane. The maximum axial velocity was measured 100 mm from the exit plane at 19,800 m/s (267 eV). Radial velocity measurements were used to determine the divergence of the plume, as well as in conjunction with the coaxial symmetry of the thruster to determine azimuthal velocities in several regions proximate to the exit plane. The 475 m/s mean azimuthal velocity was measured 5 mm from the exit plane. From this value, it is possible to estimate a maximum thruster induced torque of 3.2 x 10(exp.-5) Nm. Due to the divergence and convergence of the coaxial ion flow, distinct ion populations were observed to interact in the central core of the near plume. This is apparent in measurement volumes where multiple radial and axial velocity components were measured. These regions also typically correspond with the brightest portions of the visible plume.
DTIC

Hall Thrusters; Laser Induced Fluorescence; Plumes; Radial Velocity; Velocity Measurement

20080041634 Army Armament Research, Development and Engineering Center, Picatinny Arsenal, NJ USA

Primerless RTV Silicone Sealants/Adhesives PP-1135

Martinelli, Dean; Brescia, Joseph; Kerwien, Stacey; Rorabaugh, Donald; Osterndorf, John; Sullivan, Francis; Mao, David; Forch, Brad; Beyer, Richard; Tira, James; Apr 2003; 148 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAE30-99-C-1042; Proj-PP1135

Report No.(s): AD-A483827; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483827

This is the final report for the Strategic Environmental Research and Development Program (SERDP) funded project PP1135, Primeless RTV Silicone Sealants/Adhesives. The objective of the project, the development of primerless addition curable silicone sealants/adhesives, was met for all three phases of the program. Detailed results for the first four years of effort also were reported in SERDP technical reports Primeless RTV Silicone Sealants/Adhesives - PP1135 issued in 1999, 2000, 2001, and 2002 (References 1-4). Three Six Sigma green belt projects were completed as part of this project. The research portion of the program was divided into three phases. In the first phase, primerless, elevated-temperature curing, RTV silicone formulations that adhere to metals and glass were developed, and in the second phase, primerless, room temperature curing, RTV silicone formulations that adhere to metals and glass were developed. In the third phase of the effort primerless RTV silicone formulations that provide adhesion to selected thermoplastic substrates were developed and validated. Computational methods were used to guide the material formulation efforts, and calculations to determine the interaction between adhesion promoters and substrates resulted in the identification of promising adhesion promoter candidates. Lap shear screening tests of formulations modified with these adhesion promoters led to the development of optimized formulations, that provided adhesion to various substrates without the use of environmentally unfriendly silane primers. The final phases of this effort were focused on additional technology assessment and transitioning of the optimized formulations into DoD and DOE applications.
DTIC

Adhesives; Chemical Reactions; Room Temperature; Sealers; Silicones; Surface Reactions; Vulcanizing

20080041642 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Vibration Analysis of Commercial Thermal Barrier Coatings

Pearson, Lindell E; Jun 2008; 171 pp.; In English

Contract(s)/Grant(s): Proj-JON-08-216

Report No.(s): AD-A483839; AFIT/GAE/ENY/08-J05; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483839

Thermal barrier coatings (TBCs) are currently used in turbine engine components to protect substrate material from exposure to high temperature and corrosion. These coatings have the potential to reduce stress in critical engine parts which could increase the life cycle of these parts. The fact that these coatings are already qualified for use in turbine engines makes it worth investigating their damping properties. The problem with TBCs is that they are difficult to characterize as they display nonlinear properties. This research utilizes an experimental and finite element procedure to characterize these coatings. A scanning electron microscope (SEM) was employed to observe the microstructure contribution to the damping properties. This program utilizes a testing method which employs a test setup that attempts to eliminate any external factors which may add any unwanted damping. The major contributions of this research are: a comparison of the material properties of two different

TBCs, magnesium aluminate spinel and yttria stabilized zirconia; the confirmation that sweep rate does not cause data recorded in the log decrement method to coincide with data recorded with the half-power bandwidth method; and SEM images that confirm the damping properties of plasma sprayed TBCs are directly related to the microcrack structure of a coating.
DTIC
Dynamic Structural Analysis; Protective Coatings; Thermal Control Coatings; Thermal Insulation

20080041653 Teledyne Scientific and Imaging, LLC, Thousand Oaks, CA USA
Ultrasonically Absorptive Coatings for Hypersonic
Malmuth, Norman D; Fedorov, Alexander; Marshall, David; May 13, 2008; 10 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-06-C-0097
Report No.(s): AD-A483858; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483858

Laminar flow control (LFC) technologies reduce heat-transfer rates as well as the weight and complexity of thermal protection system (TPS). The laminar run can be substantially increased using an ultrasonically absorptive coating (UAC). The project is focused on maturing of the UAC-LFC methodology. Key components of the effort include wind-tunnel experiments, theoretical analysis, direct numerical simulation, fabrication and testing of ceramic materials that integrate UAC and TPS functions. To aid in the design of UAC with regular microstructure to be tested the CUBRC LENS I tunnel, parametric studies of the UAC-LFC performance have been conducted. The UAC parameters providing significant (more than twice) increase of the laminar run were predicted. Our theoretical model dealing with UAC of random microstructure has been refined. Direct numerical simulation of UAC roughness and pore-end effects has been started. A method of ceramic UAC fabrication was formulated and first ceramic UAC samples were made. An apparatus for benchmark measurements of UAC ultrasonic absorption was assembled and its robustness was demonstrated at low ambient pressures relevant to high-altitude flight conditions. The cone model with the felt-metal coating has been prepared for transition experiments in the ITAM AT-303 tunnel at Mach=8. The UAC-LFC technology is now approaching the large-scale demonstration stage in the CUBRC LENS tunnel as well as fabrication of ceramic UAC samples integrated into TPS.
DTIC
Coatings; Hypersonic Flow; Hypersonics

20080041694 Materials Engineering and Technical Support Services Ltd., Columbus, OH USA
Environmentally Acceptable Alternatives for Non-Destructive Inspection with Fluorescent Penetrant Dyes
Sapienza, Richard S; Ricks, William F; Grunden, Bradley L; Heater, Kenneth J; Badowski, Daniel E; Sanders, Joseph W; Aug 26, 2003; 34 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DACA72-02-P-0042
Report No.(s): AD-A483971; METSS-G-02-001; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483971

Current DoD handling and disposal costs associated with the nondestructive inspection (NDI) of metal parts (during manufacture and in-service) using fluorescent penetrant dye materials are estimated to be approximately $4 million per year. In an effort to minimize environmental impact, and reduce the handling and disposal costs associated with the use of current fluorescent dye penetrants, METSS has developed environmentally acceptable fluorescent dye penetrants for use with existing NDI techniques. METSS has utilized two specific bodies of background knowledge to support the program efforts: (1) previous efforts related to the development of non-toxic, environmentally friendly oils; and (2) previous efforts related to the development of non-toxic, environmentally friendly cleaners. Integration of this experience base into the program has resulted in the development of environmentally acceptable materials to support fluorescent dye penetrant NDI techniques in a time and cost effective manner.
DTIC
Alternatives; Dyes; Environmental Surveys; Fluorescence; Nondestructive Tests; Penetrants

20080041713 TDA Research, Inc., Wheat Ridge, CO USA
Developing Precon (Trademark), a Decontamination-Aid Coating
Smith, Bryan M; Monroe, John C; Smerjac, Suzanne M; Jul 1, 2003; 10 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484054; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484054

In a SBIR project funded through the Naval Air Warfare Center (contract N68335-00-C-0326), TDA Research has

developed a new coating product to aid in chemical defense. The water-based coating is applied to substrates prior to exposure to chemical agents and facilitates decontamination with a simple water wash should the coated substrates become contaminated. The coating is inexpensive, non-corrosive, non-flammable, and easy to use. When applied to cloth, it does not alter the water-vapor permeation rate through the fabric. After rinsing, coated cloth samples retained less than 1% of the applied GB or HD contamination, whereas uncoated cloth samples retained more than 40% of the applied agent HD even when treated with the oxidizing Sandia roam.
DTIC
Coating; Coatings; Decontamination

20080041798 Cornell Univ., Ithaca, NY USA
Non-Leaching, Benign, Fouling Control, Multilayer Polymer Coatings for Marine Applications: PP-1274 Findings
Ober, Christopher K; Sep 2003; 22 pp.; In English
Report No.(s): AD-A484133; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The goal of this research is to produce environmentally friendly coatings that protect the hulls of ships below the waterline against fouling by seaweed, barnacles, and other organisms. Fouling by these organisms produces additional drag on the ship, increasing the operating and maintenance costs. Currently, antifouling paints containing tin and copper biocides are used because of their effectiveness against most forms of fouling. However, these biocidal organometallic compounds that are environmentally persistent cause damage to the ecosystem, and enter the food chain. The ban on tributyltin (TBT) antifoulants by the International Maritime Organization will be effective in 2008, and copper-based coatings are expected to face similar restrictions in the near future. Non-toxic 'fouling-release' or 'fouling-repellant' coatings are the desirable alternatives to coatings that are biocidal. Silicone-based paints that belong to the former category are commercially available, but do not satisfy many of the desired performance characteristics. The soft silicones do not withstand the rigorous demands of the marine environment, do not sufficiently and consistently self-clean, or, due to polymer restructuring or other degradation pathways, lose many of the desirable surface properties with time and exposure to marine organisms. This report describes the synthesis and testing of block copolymers that contain semifluorinated (SF) and poly(ethylene glycol) (PEG) side groups, and show promise as non-toxic, antifouling substitutes to copper-containing paints. These surface-active groups modify the coating-water interfacial energy, conferring fouling- release or fouling-repellant properties to the surface.
DTIC
Antifouling; Block Copolymers; Fouling; Leaching; Protective Coatings; Ship Hulls

20080041800 Michigan State Univ., East Lansing, MI USA
Aerobic and Anaerobic Transformation of cis-Dichloroethene (cis-DCE) and Vinyl Chloride (VC): Steps for Reliable Remediation
Tiedje, James M; Loeffler, Frank E; Fathepure, Babu Z; Petrovskis, Erik A; Dec 2003; 85 pp.; In English
Report No.(s): AD-A484135; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Considerable research has focused on the anaerobic transformation of PCE and TCE, two of the most common chlorinated solvents found in groundwater. However, relatively little is known about the types of microorganisms and specific environmental conditions associated with the dechlorination of dichloroethenes (DCEs) and vinyl chloride (VC). For the successful remediation of a contaminated site, the complete reduction to the environmentally benign products (e.g., ethene and inorganic chloride), or complete mineralization must be achieved. Recent research identified four different microbial processes that determine the fate of these compounds in groundwater. These processes include: * Anaerobic energy-yielding reductive dechlorination (chlororespiration) (Process 2) * Anaerobic energy-yielding oxidation (Process 3) * Aerobic cooxidation (Process 4) * Aerobic energy-yielding oxidation (Process 5)
DTIC
Activity (Biology); Aerobes; Anaerobes; Chlorides

20080041891 Michigan Univ., Ann Arbor, MI USA
MEANS II: Knowledge Oriented Materials Engineering of Layered Thermal Barrier Systems (NOMELT)
Pollock, Tresa M; Jun 22, 2008; 21 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-05-1-0229
Report No.(s): AD-A484347; UM-F012521; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A team from academia, Air Force laboratories and industry has been assembled to develop a design code for one of the prevailing failure modes in thermal barrier systems used for aero-turbines. The failure mechanism to be addressed occurs in

systems with two-phase bond coats and is manifest as abrupt delamination along the interface between the thermally grown oxide (TGO) and the intermetallic bond coat. The code will integrate several important time/cycle dependent phenomena, each with associated constituent models for: interface adhesion, bond coat deformation, sintering in the thermal barrier layer, etc. In this the second year of the project, efforts have focused on experimental characterization of the various layers and the development of hierarchical models, both of which are needed to characterize and define the salient governing phenomena. A previously developed interfacial delamination model is being adapted for this problem, and integration of these efforts will provide the pathway to the TBC design code. The focus of the University of Michigan effort was on (1) the evolution of the bond coat structure and properties during elevated temperature exposure under oxidizing conditions and (2) the development of a new apparatus for studying the failure process during cyclic oxidation of the MCrAlY class of coatings. Background and motivation for this research are first reviewed and a summary of results in the above two areas is given.
DTIC
Bonding; Expert Systems; Knowledge Representation; Microstructure; Thermal Control Coatings

20080042037 Beyer, Weaver and Thomas, LLP, Oakland, CA, USA; SRI International Corp., Menlo Park, CA, USA
Electroactive Polymers (PAT-APPL-11-335 030)
Pei, O., Inventor; Pelrine, R. E., Inventor; Kornbluh, R. D., Inventor; 18 Jan 06; 38 pp.; In English
Contract(s)/Grant(s): N00014-96-C-0026; DAAG55-98-K-001
Patent Info.: Filed Filed 18 Jan 06; US-Patent-Appl-SN-11-335 030
Report No.(s): PB2008-102506; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention relates to transducers, their use and fabrication. The transducers convert between mechanical and electrical energy. Some transducers of the present invention include a pre-strained polymer. The pre-strain improves the conversion between electrical and mechanical energy. The present invention also relates to devices including an electroactive polymer to convert between electrical and mechanical energy. The present invention further relates to compliant electrodes that conform to the shape of a polymer included in a transducer. The present invention provides methods for fabricating electromechanical devices including one or more electroactive polymers.
NTIS
Electroactive Polymers; Electrodes; Patent Applications; Transducers

20080042040 SubChem Systems, Inc., Jamestown, RI USA; Rhode Island Univ., Narragansett, RI, USA
Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations from Profiling Moorings, Gliders and other AUVs
Hanson, Alfred K; Donaghay, Percy L; Moore, Casey; Arrieta, Richard; Jan 2005; 9 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-05-1-0647; N00014-05-1-0648; N00014-05-1-0649; MIPR-N00014-05-WX20853
Report No.(s): AD-A483691; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The long term goal is to transition existing prototype autonomous profiling nutrient analyzers into commercial products that can be readily deployed on autonomous profiling moorings, coastal gliders and propeller driven unmanned underwater vehicles and used for sustained, autonomous ocean observations of chemical distributions and variability. A series of issues have been identified that need to be addressed. These issues are; (1) a more compact size, (2) reduced reagent and power consumption, (3) enhanced biofouling suppression, (4) ease of use by non-chemists, and (5) documented performance when deployed on different platforms. Our plan to address those issues involves using recent advances in micro-fluidics and optical detectors (new SubChem and WET Labs technologies) to reduce sample flow rates and volumes and thus reagent and power consumption; (2) extend the length of field deployments by periodically isolating sensitive components so that back-flushing and chemical techniques can be used to suppress biofouling, (3) increase the ease of use by simplifying operation, pre-packaging reagents and outputting the data in engineering units, and (4) thoroughly documenting the performance by conducting demonstration experiments at field sites that have strong vertical and horizontal nutrient gradients and episodic phytoplankton blooms. We intend to achieve these goals through this NOPP partnership. The industry partners will take the lead in developing the commercial versions of the nutrient analyzers while the university and government partners will provide guidance defining the initial performance criteria for the nutrient analyzers and in providing the deployment platforms and conducting the field testing and demonstration experiments. Two new submersible nutrient analyzers were designed, fabricated, tested and deployed in the field.
DTIC
Autonomy; Chemical Analysis; Gliders; Marine Chemistry; Mooring; Nutritional Requirements

20080042065 Beyer, Weaver and Thomas, LLP, Oakland, CA, USA; SRI International Corp., Menlo Park, CA, USA
Electroactive Polymers (PAT-APPL-11-335 805)
Pei, Q., Inventor; Pelrine, R. E., Inventor; Kornbluh, R. D., Inventor; 18 Jan 06; 38 pp.; In English
Contract(s)/Grant(s): N00014-96-C-0026; DAAG55-98-K-001
Patent Info.: Filed Filed 18 Jan 06; US-Patent-Appl-SN-11-335 805
Report No.(s): PB2008-102505; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention relates to transducers, their use and fabrication. The transducers convert between mechanical and electrical energy. Some transducers of the present invention include a pre-strained polymer. The pre-strain improves the conversion between electrical and mechanical energy. The present invention also relates to devices including an electroactive polymer to convert between electrical and mechanical energy. The present invention further relates to compliant electrodes that conform to the shape of a polymer included in a transducer. The present invention provides methods for fabricating electromechanical devices including one or more electroactive polymers.
NTIS
Electroactive Polymers; Electrodes; Patent Applications; Transducers

20080042068 Molecular Imprints, Inc., Austin, TX, USA
Methods of Exposure for the Purpose of Thermal Management for Imprint Lithography Processes
Sreenivasan, S. V., Inventor; Choi, B. J., Inventor; 30 Nov 05; 9 pp.; In English
Contract(s)/Grant(s): 70NANB4H3012
Patent Info.: Filed Filed 30 Nov 05; US-Patent-Appl-SN-11-292 402
Report No.(s): PB2008-102486; No Copyright; Avail.: CASI: A02, Hardcopy

The present invention is directed to a method that attenuates, if not avoids, heating of a substrate undergoing imprint lithography process and the deleterious effects associated therewith. To that end, the present invention includes a method of patterning a field of a substrate with a polymeric material that solidifies in response to actinic energy in which a sub-portion of the field is exposed sufficient to cure the polymeric material is said sub-portion followed by a blanket exposure of all of the polymeric material associated with the entire field to cure/solidify the same.
NTIS
Exposure; Lithography; Patent Applications; Temperature Control

20080042134 Department of Energy, Washington, DC USA
Influence of a Cerium Surface Treatment on the Oxidation Behavior of Commercial Fe- and Ni-Base Alloys
Alman, D. E.; Jablonski, P. D.; Oct. 01, 2006; 32 pp.; In English
Report No.(s): DE2007-916948; DOE/NETL-IR-2007-025; No Copyright; Avail.: National Technical Information Service (NTIS)

No abstract available
Cerium; Iron Alloys; Nickel Alloys; Oxidation; Surface Finishing; Surface Treatment

20080042144 Fish and Richardson, PC, Minneapolis, MN, USA
Adhesion of a Metal Layer to a Substrate and Related Structures
Watkins, J. J., Inventor; Zong, Y., Inventor; 24 Feb 06; 21 pp.; In English
Contract(s)/Grant(s): CTS-9734177; CTS-0245002
Patent Info.: Filed Filed 24 Feb 06; US-Patent-Appl-SN-11-363 403
Report No.(s): PB2008-104532; No Copyright; Avail.: CASI: A03, Hardcopy

Methods and resulting structures are described in which a metal layer is adhered to a surface of a substrate. The methods involve applying a sacrificial acidic organic layer to the surface of the substrate prior to depositing the metal layer onto the substrate. During deposition of the metal layer, the sacrificial acidic organic layer is substantially consumed, thereby leaving behind a metal/substrate interface that has excellent adhesion properties.
NTIS
Adhesion; Patent Applications; Substrates

20080042223 Universal Technology Corp., Dayton, OH USA
Technical Operations Support (TOPS) II. Delivery Order 0007: Thermal Barrier Coatings
Feb 2005; 22 pp.; In English
Contract(s)/Grant(s): F333615-01-D-5801-0007; Proj-4349
Report No.(s): AD-A484239; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This work formed the second part of an investigation into the use of Gd203 as an alternative stabilizer for Zr02-based thermal barrier coating (TBC) materials. The current state-of-the-art TBC material, Y203-stablized Zr02 (3.5-4 mole percent y203), referred to as YSZ, suffers from limited durability at use temperature above 100-1200 deg C. Our previous work investigated the influence of Gd203 concentration on the sintering and phase stability of conventional Zr02 powders. In this work, the effect of Gd203 concentration (420mo1%) on the sintering and phase transformation of plasma-sprayed Zr02 powders was investigated and the data were compared with those for YSZ.
DTIC
Protective Coatings; Thermal Control Coatings

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COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

20080040911 Bruckner (John), PC, Austin, TX, USA
Nanorods and Other Materials from Condensed Phase Conversion and Growth Instead of from Vapor
Geohegan, D. B., Inventor; Seals, R. D., Inventor; Puretzky, A. A., Inventor; Fan, X., Inventor; 18 Jan 05; 37 pp.; In English
Contract(s)/Grant(s): DE-AC05-96OR22464; DE-AC05-84OR21400
Patent Info.: Filed Filed 18 Jan 05; US-Patent-Appl-SN-11-037 578
Report No.(s): PB2008-104327; No Copyright; Avail.: CASI: A03, Hardcopy

Compositions, systems and methods are described for condensed phase conversion and growth of nanorods and other materials. A composition includes a plurality of nanorods that define a local volume, said local volume including a fraction, said plurality of nanorods within at least said fraction of said local volume interrelated to define (a) a substantially random distribution of intersection angles between said plurality of nanorods and (b) a localized packing density greater than 50% of a theoretical maximum packing density, which does not account for any voids within said plurality of nanorods. The compositions are very strong. The compositions and methods provide advantages because they allow (1) formation rates of nanostructures necessary for reasonable production rates, and (2) the near net shaped production of component structures.
NTIS
Composite Materials; Nanorods; Nanostructures (Devices); Patent Applications; Vapor Phases; Vapors

20080040912 UT-Battelle, LLC, Oak Ridge, TN, USA
Cellulosic Insulation Containing a Phase Change Material as an Active Thermal Mass Component
Kosny, J., Inventor; Yarbrough, D. W., Inventor; 23 Nov 04; 6 pp.; In English
Contract(s)/Grant(s): DE-AC05-00OR22725
Patent Info.: Filed Filed 23 Nov 04; US-Patent-Appl-SN-10-995 450
Report No.(s): PB2008-104326; No Copyright; Avail.: CASI: A02, Hardcopy

A composite thermal insulation material includes a cellulosic fiber matrix component and a phase-change material dispersed in the cellulosic fiber matrix component.
NTIS
Cellulose; Insulation; Patent Applications; Thermal Insulation

20080040942 Lane (Philip D), Charlotte, NC, USA
Intermittently Connected Metal Matrix Composite Bars
Joseph, B. E., Inventor; Nolte, R., Inventor; Rowe, M. M., Inventor; Witzgall, J. F., Inventor; Wolfe, G. W., Inventor; 4 Feb 05; 12 pp.; In English
Contract(s)/Grant(s): DAAD19-01-2-0006
Patent Info.: Filed Filed 4 Feb 05; US-Patent-Appl-SN-11-051 488
Report No.(s): PB2008-103808; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention provides for assemblies comprising metal matrix composite bars where the bars only intermittently

have mutual contact. Minimally two bars of metal matrix composite are joined, for example by lap joints, or by the use of incorporated tabs and slots or over-lapping slots, at areas of mutual contact to form the assemblies. The metal matrix composite assemblies of the present invention may be readily assembled to provide structures, supports, or sub-assemblies, and the like, that may exhibit high strength and stiffness coupled with relatively low mass. Additionally, such assemblies may withstand exposure to elevated temperatures higher than can be tolerated by polymeric composites. Such assemblies are expected to be particularly suitable for lightweight, stiff support structures for space booms, satellite structures, mirror backings, solar panel supports, wall reinforcement, and the like.
NTIS
Metal Matrix Composites; Patent Applications

20080040963 Ottawa Univ., Ontario, Canada
On the Functional Characterization of 'Intelligent' Materials
Haddad, Y. M.; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 12 pp.; In English; See also 20080040944; Original contains color illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The paper discusses possible forms of intelligence that may be incorporated in various classes of engineering materials. Basic mechanisms of intelligent materials are described, and implementation of these in the microstructure of the material, as well as associated algorithms and techniques are illustrated. Different models pertaining to the functional characterization of intelligent material systems are presented.
Author
Microstructure; Smart Materials; Actuators

20080041129 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Evaluating the Response of Polyvinyl Toluene Scintillators used in Portal Detectors
Rakes, Kelly D; Mar 2008; 137 pp.; In English
Report No.(s): AD-A483290; AFIT/GNE/ENP/08-M04; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483290

Scintillator panels of the same type as those used in portal detector units, made of polyvinyl toluene and measuring 12 x 15 x 2 in were purchased from three vendors. Each vendor supplied two scintillators, one wrapped by the vendor with aluminum foil coated mylar, and two unwrapped. The scintillators where exposed to a ~8 microCurie source collimated 137Cs source which decays with a 662 keV gamma-ray 85% of the time. A Hamamatsu R329-02 photomultiplier tube was optically mated to the 12 x 2 in surface of the scintillator. The pulse-height spectrum was recorded with the source placed at different positions across the surface of the scintillator. Analysis of the pulse-height spectrum determined efficiency and resolution differences across the surface of the scintillation panels. The resolution ranged from 23% at the corner furthest from the PMT to 33% an inch away from the PMT. The absolute efficiency ranged from 0.02 to 0.027 . The location and height of the Compton edge had trends, with the greatest height at the center and dropping off on the sides, but the peak location having a maximum in the corner along the axis of the PMT
DTIC
Detectors; Scintillation; Scintillation Counters; Toluene; Vinyl Polymers

20080041474 National Center for Defense Manufacturing and Machining, Latrobe, PA USA
Aluminum/Silicon Carbide Matrix Material for Targeting System
Slusarcyk, Joe; Jul 21, 2006; 6 pp.; In English
Contract(s)/Grant(s): W31P4Q-05-D-R003; Proj-06-0081-02
Report No.(s): AD-A483337; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483337

Lockheed Martin Missiles & Fire Control (LMMFC) of Orlando, FL, is currently in the process of producing components using Metal Matrix Composite (MMC) materials. This material is most desirable in high performance applications due to their improved material properties over monolithic metals. The most common MMC is cast aluminum reinforced with various amounts of silicon carbide. LMMFC is currently machining very high precision components for targeting systems from cast aluminum/silicon carbide (AlSiC) matrix material (with a very high SiC content) and are experiencing difficulty achieving the accuracy they require due to excessive tool wear and failure, from the properties of this material. LMMFC demands are

increasing for the manufacture of targeting systems from AISiC matrix material. Therefore, LMMFC called upon the National Center for Defense Manufacturing and Machining (NCDMM) to research and provide a more efficient solution to produce these components to specifications required by LMAC.
DTIC
Aluminum Carbides; Matrix Materials; Metal Matrix Composites; Silicon Carbides

20080041623 Missouri Univ., Rolla, MO USA
Spatially Tailored and Functionally Graded Light-Weight Structures for Optimum Mechanical Performance
Birman, Victor; Jan 15, 2008; 27 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-07-1-0290
Report No.(s): AD-A483794; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483794

The study illustrates the effectiveness of three-phase functionally graded material systems where stiff (typically ceramic) particles are incorporated within the fiber-reinforced medium. Added particles increase the stiffness of the fiber-reinforced material reducing static and dynamic stresses and deformations, increasing buckling loads and fundamental frequencies and enhancing the response to blast loading. The micromechanical model presented in the study represents an extrapolation of the Mori-Tanaka homogenization approach to the case of the system with dissimilar inclusions. It is shown that the material constants (elastic moduli and Poisson's ratios) obtained by the method developed in the study are within the Voight-Reuss and Hashin-Shtrikman bounds. Moreover, the stiffness of a representative cross-ply material remains within the strict three-point bounds. Accordingly, the developed micromechanical model is applicable to the analysis of cross-ply functionally graded particulate-matrix fiber-reinforced materials. The tensors of stiffness obtained by the model are applied to illustrate the effectiveness of three-phase particulate-matrix fiber-reinforced materials in representative static and dynamic problems. In particular, it is shown that blast-induced deformations and stresses can be significantly reduced by adding only a small amount of particles to the outer layers of a fiber-reinforced material.
DTIC
Composite Materials; Optimization

20080041686 Louisiana State Univ., Baton Rouge, LA USA
Multi-scale Analysis of Heterogeneous Media
Lipton, Robert; Jun 15, 2008; 16 pp.; In English
Contract(s)/Grant(s): FA9550-05-1-0008
Report No.(s): AD-A483948; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483948

The project develops new mathematical tools for the description of multi-scale stress transfer inside composite materials. The first research activity provides new mathematical methods to characterize the extreme local stress excursions inside linear elastic composite materials. Research in this area has lead to new asymptotic formulations for the local stress excursions across lamina interfaces inside fiber reinforced laminates. New fast computational methods for calculating bounds on the extreme local stress excursions inside prestressed composites are developed using the asymptotic expansions. The second research track examines the effects of elasto-plasticity on the extreme local stress excursions inside composite media. New upper bounds on the strength domain of the composite are found that incorporate multi-scale information on the norms of solutions to nonlinear elasticity and conductivity problems. The third research activity develops a novel and systematic computational design method for the design of composite structures that hedge against structural failure. The fourth research thrust characterizes the influence of the boundary data on the local stress fluctuations inside microstructured media. New rigorous lower bounds on the boundary layer decay of stress fluctuations with respect to the length scale of oscillation in the boundary data have been obtained.
DTIC
Composite Materials; Composite Structures; Heterogeneity; Stress Analysis

20080042029 Dierker Julia Church and Dierker and Associates, PC, Troy, MI, USA
Modified Porous Materials and Method of Forming the Same
Ma, P. X., Inventor; Liu, X., Inventor; 30 Nov 04; 21 pp.; In English
Contract(s)/Grant(s): DE014755; DE015384

Patent Info.: Filed Filed 30 Nov 04; US-Patent-Appl-SN-10-999 459
Report No.(s): PB2008-102451; No Copyright; Avail.: CASI: A03, Hardcopy

Modified porous materials are disclosed having interconnected, complexly shaped three-dimensional surfaces. The modification is accomplished by crosslinking the three-dimensional surfaces and/or by coating the three-dimensional surfaces with a layer of a predetermined material. The porous materials are macro structures including at least one of nano-features, micro-features, and combinations thereof. The modifying accomplishes changing surface properties of the porous materials, changing the three-dimensional surfaces, and/or rendering the porous materials substantially stable in a predetermined environment.

NTIS

Patent Applications; Porous Materials

20080042264

SiC/SiC Composites Incorporating Uncoated Fibers to Improve Interlaminar Strength

Subramanian, S., Inventor; Steibel, J. D., Inventor; Carper, D. M., Inventor; 29 Dec 04; 10 pp.; In English
Contract(s)/Grant(s): N00421-00-3-0-0536
Patent Info.: Filed Filed 29 Dec 04; US-Patent-Appl-SN-11-025 510
Report No.(s): PB2008-103951; No Copyright; Avail.: CASI: A02, Hardcopy

The present invention is a ceramic matrix composite (CMC) turbine engine component, wherein the component has a region of expected higher interlaminate stress during normal engine operation. The component includes both coated fiber tows and uncoated fiber tows arranged together into a preselected form, wherein the uncoated fiber tows are located at predetermined regions of expected high interlaminate stress. The invention further includes method of manufacturing a CMC such as a composite turbine engine component, wherein the component has a region of expected higher interlaminate stress during engine operation.

NTIS

Ceramic Matrix Composites; Gas Turbine Engines; Silicon Carbides

20080042267 Alston and Bird, LLP, Charlotte, NC, USA; North Carolina State Univ., Raleigh, NC USA

Composite Metal Foam and Methods of Preparation Thereof

Rabiei, A., Inventor; 29 Nov 05; 24 pp.; In English
Contract(s)/Grant(s): 0238929
Patent Info.: Filed Filed 29 Nov 05; US-Patent-Appl-SN-11-289 661
Report No.(s): PB2008-103933; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention is directed to composite metal foams comprising hollow metallic spheres and a solid metal matrix. The composite metal foams show high strength, particularly in comparison to previous metal foams, while maintaining a favorable strength to density ratio. The composite metal foams can be prepared by various techniques, such as powder metallurgy and casting.

NTIS

Composite Materials; Metal Foams; Metals

20080042269 Mcnees Wallace and Nurick, LLC, Harrisburg, PA, USA; General Electric Co., Schenectady, NY, USA

Ceramic Composite with Integrated Compliance/Wear Layer

Carper, D. M., Inventor; Subramanian, S., Inventor; 29 Dec 04; 9 pp.; In English
Contract(s)/Grant(s): N00421-00-3-0536
Patent Info.: Filed Filed 29 Dec 04; US-Patent-Appl-SN-11-025 222
Report No.(s): PB2008-103932; No Copyright; Avail.: CASI: A02, Hardcopy

The integral layer provides a ductile interface for attachment locations of a turbine engine component where a metallic surface is adjacent the attachment location. The ductile layer provides a favorable load distribution through the composite at the attachment location, and eliminates the need for a metallic shim.

NTIS

Ceramics; Wear; Ceramic Matrix Composites; Ductility

20080042367 Synnestvedt and Lechner, LLP, Philadelphia, PA, USA

Nanostructure Composites (PAT-APPL-10-507 879)

Johnson, A. T., Inventor; Winey, K. I., Inventor; Gama, G. J., Inventor; Biercuk, M. J., Inventor; Hone, J., Inventor; 20 Mar 03; 9 pp.; In English

Patent Info.: Filed Filed 20 Mar 03; US-Patent-Appl-SN-10-507 879
Report No.(s): PB2008-104716; No Copyright; Avail.: CASI: A02, Hardcopy

Compositions comprising a highly dispersed mixture of nanostructures and polymeric materials in a solvent or suspension medium, composites made therefrom having enhanced mechanical, thermal and electronic properties, and methods for making such composites are provided.

NTIS

Nanostructure (Characteristics); Nanostructures (Devices); Patent Applications

20080042371 UT-Battelle, LLC, Oak Ridge, TN, USA

Combinatorial Synthesis of Ceramic Materials

Lauf, R. J., Inventor; Walls, C. A., Inventor; Boatner, L. A., Inventor; 13 Mar 06; 13 pp.; In English
Contract(s)/Grant(s): DE-AC05-00OR22725
Patent Info.: Filed Filed 13 Mar 06; US-Patent-Appl-SN-11-374 235
Report No.(s): PB2008-104709; No Copyright; Avail.: CASI: A03, Hardcopy

A combinatorial library includes a gelcast substrate defining a plurality of cavities in at least one surface thereof; and a plurality of gelcast test materials in the cavities, at least two of the test materials differing from the substrate in at least one compositional characteristic, the two test materials differing from each other in at least one compositional characteristic.

NTIS

Ceramics; Combinatorial Analysis; Patent Applications

25
INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY

Includes the analysis, synthesis, and use of inorganic and organic compounds; combustion theory; electrochemistry; and photochemistry. For related information see category *34 Fluid Dynamics and Thermodynamics*. For astrochemistry see category *90 Astrophysics*.

20080040847 Foley and Lardner, LLP, San Diego, CA, USA

Contacting Systems and Methods and Uses Thereof

Koenig, D., Inventor; Limaye, S., Inventor; Appel, W. S., Inventor; 30 Nov 04; 21 pp.; In English
Contract(s)/Grant(s): FA8650-04-C-2457
Patent Info.: Filed Filed 30 Nov 04; US-Patent-Appl-SN-11-001 701
Report No.(s): PB2008-104361; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention provides systems and methods for facilitating contact between a liquid and a fluid. Such systems and methods may allow efficient removal of components from the liquid without using undesirable reducing agents. In this regard, the disclosed embodiments provide for the purification of a liquid by passing the liquid and a fluid through a porous medium. The porous medium facilitates mixing of the liquid and the fluid. A partial pressure differential of the component between the liquid and the fluid facilitates the transfer of the component from the liquid to the fluid in the mixed liquid and fluid. One embodiment of the invention relates to a method of purifying a liquid. The method includes passing a liquid, such as a fuel, and a fluid, such as a non-reactive gas, through a porous medium, the liquid containing a component, such as oxygen gas, therein. The passing causes mixing of the liquid and the fluid and transfer of at least some of the component from the liquid to the fluid. The method also includes separating the liquid and the fluid, the separated fluid including at least some of the component.

NTIS

Liquids; Patent Applications

20080040902 Greenberg, Traurig, LLP., Santa Monica, CA, Santa Monica, CA, USA

Ammonia-Based Hydrogen Generation Apparatus and Method for Using Same

Chellappa, A., Inventor; Powell, M. R., Inventor; 18 Apr 05; 29 pp.; In English
Contract(s)/Grant(s): DAAD19-01-C-0002
Patent Info.: Filed Filed 18 Apr 05; US-Patent-Appl-SN-11-109 227
Report No.(s): PB2008-104354; No Copyright; Avail.: CASI: A03, Hardcopy

The present disclosure provides teachings relating to ammonia-based hydrogen generation apparatus and associated methods of use. Exemplary methods and apparatus comprise a thermocatalytic hydrogen generation reactor which includes a

reaction chamber containing a catalyst-coated substrate, and a combustion chamber containing a catalyst-coated substrate. Exemplary catalyst-coated substrates include, but are not limited to, metal foam, monolith, mesh, ceramic foam or ceramic monolith.
NTIS
Ammonia; Hydrogen; Patent Applications

20080040906 Peabody (Nixon), LLP, Rochester, NY, USA; State Univ. of New York, Stony Brook, NY, USA
G-Matrix Fourier Transformation (GFT) Nuclear Magnetic Resonance (NMR) Experiments for Resonance Assignment and Structure Determination of Organic Molecules
Szyperski, T. A., Inventor; Atreya, H. S., Inventor; Eletski, A., Inventor; 18 Oct 05; 119 pp.; In English
Contract(s)/Grant(s): P50 GM62413-01; MCB 00075773
Patent Info.: Filed Filed 18 Oct 05; US-Patent-Appl-SN-11-253 262
Report No.(s): PB2008-104343; No Copyright; Avail.: CASI: A06, Hardcopy

The present invention discloses a suite of G(sup 2)FT and GFT NMR experiments that can be used for complete resonance assignments of proteins and for obtaining structural (conformational and orientational) constraints for determining high resolution three-dimensional structures of biomolecules.
NTIS
Biochemistry; Fourier Transformation; Matrices (Mathematics); Molecules; Nuclear Magnetic Resonance; Patent Applications; Proteins; Transformations (Mathematics)

20080040934 Savannah River National Lab., Aiken, SC, USA
Electrochemical Studies on the Corrosion of Carbon Steel in Oxalic Acid Cleaning Solutions
Wiersma, B. J.; Mickalonis, J. I.; Oct. 2007; 20 pp.; In English
Contract(s)/Grant(s): DE-AC09-96SR18500
Report No.(s): DE2007-918135; WSRC-STI-2007-00559; No Copyright; Avail.: National Technical Information Service (NTIS)

The Savannah River Site (SRS) will disperse or dissolve precipitated metal oxides as part of radioactive waste tank closure operations. Previously SRS has utilized oxalic acid to accomplish this task. Since the waste tanks are constructed of carbon steel, a significant amount of corrosion may occur. Although the total amount of corrosion may be insignificant for a short contact time, a significant amount of hydrogen may be generated due to the corrosion reaction. Linear polarization resistance and anodic/cathodic polarization tests were performed to investigate the corrosion behavior during the process. The effect of process variables such as temperature, agitation, aeration, sample orientation, light as well as surface finish on the corrosion behavior were evaluated. The results of the tests provided insight into the corrosion mechanism for the iron-oxalic acid system.
NTIS
Carbon Steels; Cleaning; Corrosion; Corrosion Resistance; Oxalic Acid; Radioactive Wastes

20080040935 Foley and Lardner, LLP, Washington, DC, USA; California Inst. of Tech., Pasadena, CA USA
Large Grained Polycrystalline Silicon and Method of Making Same
Richardson, C. E., Inventor; Atwater, H. A., Inventor; 16 Nov 05; 13 pp.; In English
Contract(s)/Grant(s): DE-AC36-99G010337
Patent Info.: Filed Filed 16 Nov 05; US-Patent-Appl-SN-11-274 197
Report No.(s): PB2008-103818; No Copyright; Avail.: CASI: A03, Hardcopy

A silicon structure includes a selective nucleating single phase epitaxial (SNSPE) template polysilicon layer containing crystallization catalyst residue, and a hot wire chemical vapor deposited (HWCVD) epitaxial polysilicon layer epitaxially grown on said template layer. The silicon structure may satisfy at least one of the following: (1) a thickness of the SNSPE template layer is less that about 60 nm; (2) a thickness of the HPCVD layer is greater than about 60 nm. The silicon structure may be used in a polysilicon solar cell or other solid state devices. A method of making a polysilicon layer includes providing a first layer comprising an amorphous silicon or a polysilicon layer containing a crystallization catalyst or in contact with a crystallization catalyst, and annealing the first layer in a silicon containing atmosphere to at least partially crystallize the first layer.
NTIS
Patent Applications; Polycrystals; Silicon

20080041027 Kirsch (Alan D.), Idaho Falls, ID, USA
Method for Producing a Borohydride
Kong, P. C., Inventor; 17 Nov 04; 15 pp.; In English
Contract(s)/Grant(s): DE-AC07-991D13727
Patent Info.: Filed Filed 17 Nov 04; US-Patent-Appl-SN-10-992 441
Report No.(s): PB2008-103802; No Copyright; Avail.: CASI: A03, Hardcopy

A method for producing a borohydride is described and which includes the steps of providing a source of borate; providing a material which chemically reduces the source of the borate to produce a borohydride; and reacting the source of borate and the material by supplying heat at a temperature which substantially effects the production of the borohydride.
NTIS
Borohydrides; Patent Applications; Borates

20080041040 New Jersey Dept. of Health, Trenton, NJ, USA
Health Consultation: Mercury Exposure Investigation Using Serial Urine Testing and Medical Records Review. Kiddie Kollege, Franklinville, Gloucester County, New Jersey. EPA Facility ID: NJN000206028
Jun. 13, 2007; 23 pp.; In English
Report No.(s): PB2008-104060; No Copyright; Avail.: CASI: A03, Hardcopy

The purpose of this health consultation is to summarize an investigation of elemental mercury exposures to children and staff at the Kiddie Kollege day care center, located at 1600 South Delsea Drive in Franklin Township, Gloucester County, New Jersey. Through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), the New Jersey Department of Health and Senior Services (NJDHSS) prepared the following health consultation, in cooperation with the Centers for Disease Control and Preventions (CDC) National Center for Environmental Health (NCEH) laboratory to assess the public health implications associated with these exposures. The investigation consisted of a targeted mercury exposure screening and an evaluation of medical records.
NTIS
Children; Exposure; Health; New Jersey; Urine; Mercury (Metal)

20080041043 New York State Office of Public Health, Albany, NY, USA
Health Consultation: Public Health Implications of Exposures to Low-Level Volatile Organic Compounds in Public Drinking Water. Endicott Area Investigation, Broome County, New York
Nov. 30, 2006; 64 pp.; In English
Report No.(s): PB2008-104050; No Copyright; Avail.: CASI: A04, Hardcopy

On October 12, 2004, NYS DOH and ATSDR released this health consultation for public comment. During the public comment period which ended on November 12, 2004, several comments were received. One of the main comments related to not including trichloroethene (TCE), one of the primary chemicals of concern to the public, in the original analysis. In addition, the public was concerned about several other aspects of the original analysis and conclusions. In response to these comments, the analyses conducted for the public comment draft health consultation were revised to include TCE. In addition, other analyses were conducted to address the community's concerns related to the original analysis. ATSDR and NYS DOH staff met with the members of the Western Broome Environmental Stakeholders Coalition (WBESC) on May 24, 2005, to discuss the health agencies response to public comments. The responses to all of the submitted public comments are shown in Appendix F.
NTIS
Health; New York; Potable Water; Public Health; Trichloroethylene

20080041064 Virginia Commonwealth Univ., Richmond, VA USA
The Structure of Silicon Surfaces from (001) to (111)
Baski, A A; Erwin, S C; Whitman, L J; Jan 1997; 33 pp.; In English
Report No.(s): AD-A483141; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483141

We describe the structure of silicon surfaces oriented between (001) and (111) as determined by scanning tunneling microscopy (STM) and first-principles, total-energy calculations. In addition to reviewing and reproducing the structures reported for the few surfaces previously studied, we describe a number of additional surfaces in order to provide a complete overview of the (001)-to-(111) surface morphology. As the sample orientation is tilted from (001) to (111) (Theta = 0 degrees

to 54.7 degrees), the surface morphology varies as follows: 1) Si(001) to Si(114): (001)-like surfaces composed of dimers separated by steps (both rebonded and non-rebonded); 2) Si(114) to Si(113): mesoscale sawtooth facets composed of the stable (114)-2x1 and (113)-3x2 planes; 3) Si(113) to Si(5 5 12): mesofacets composed of (113)-3x2 and (5 5 12)-like planes; 4) Si(5 5 12) to ~Si(223): nanoscale sawtooth facets composed of (5 5 12)-like and unit-cellwide (111)-7 7 planes; and 5' ~Si(223) to Si(111): (111)-7 7 terraces separated primarily by single- and triple-layer steps. The change in the surface morphology is accompanied by a change in the composition of surface structural units, progressing from (001)-like structures 'e.g. dimers, rebonded steps, and tetramers) to (111)-like structures (Pi-bonded chains, adatoms, and dimer-chain walls). The resultant morphology is a delicate balance between the reduction of dangling bond density achieved by the formation of these structural units, and the resulting surface stress associated with their unusual bond angles and bond lengths.
DTIC
Silicon; Surface Properties; Wafers

20080041110 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Characterization and Control of Carbon Dioxide Seed Particles in Particle Image Velocimetry
Greene, Bartt G; Mar 2008; 102 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483253; AFIT/GAE/ENY/08-M12; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483253

Carbon Dioxide (CO2) particles exiting from a variety of feed tube and shroud configurations, and in combination with varying volumetric flow rates of purge air were measured using a laser diffraction device. CO2 particles were then injected into the stilling chamber of two open-circuit blow down supersonic wind tunnels to obtain PIV measurements. A ten degree ramp placed in the test section of one wind tunnel produced a shock wave which allowed for the characterization of the time response of the CO2 particles as they crossed the shock wave. This time response was compared with theoretical time responses of varying diameter CO2 particles in order to characterize the spherical diameter of the actual CO2 particles. Purge air was used to demonstrate the ability to alter the size of particles by altering the time response of the particles across the shock wave. A scale up was performed to demonstrate the applicability of the clean seeding technique to different size wind tunnels. Initial particle measurements demonstrate the ability to control the size of CO2 particles which is backed up by actual PIV measurements confirming size characterization.
DTIC
Carbon Dioxide; Particle Image Velocimetry; Seeds

20080041117 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Neutron Detection Utilizing Gadolinium Doped Hafnium Oxide Films
Blasy, Bryan D; Mar 2008; 58 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483262; AFIT/GNE/ENP/08-M02; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483262

Gadolinium (Gd) doped hafnium oxide (HfO2) was deposited onto a silicon substrate using pulsed laser deposition. Synchrotron radiation was used to perform Gd L3-edge extended X-ray absorption fine structure (EXAFS) measurements on 3%, 10%, and 15% doped HfO2 samples. The interatomic distances determined from Fourier transformation and fitting the data show Gd occupying the hafnium site in the HfO2 lattice, there was no clustering of Gd atoms, and the Gd ion retains monoclinic local symmetery for all levels of doping. Current as a function of voltage experiments identified the films as having poor diode characteristics with high leakage current in the forward bias region. However, a proper bias (0.5 V) for the purpose of neutron detection was identified and applied across the diodes. Using a high, non-varying neutron flux in a nuclear reactor, Gd doped HfO2 was able to be used in a detection system and displayed the ability to detect neutrons.
DTIC
Detection; Doped Crystals; Gadolinium; Hafnium Oxides; Neutrons; Oxide Films

20080041118 TDA Research, Inc., Wheat Ridge, CO USA
Chemistries for Protection and Decontamination
Bell, William; Mar 2008; 42 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483264; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483264

OUTLINE of PRESENTATION: Protection -- Conductive polymer CW agent sensors for protective clothing. Hazard

Mitigation -- Electrochemically generated decon solution * Decon assurance spray * Catalytic self-decontaminating coatings.
DTIC
Decontamination; Inorganic Chemistry; Organic Chemistry; Protection

20080041134 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA
Evaluation of Metal-Organic Frameworks for the Removal of Toxic Industrial Chemicals
Peterson, Gregory W; Mahle, John J; Balboa, Alex; Sewell, Tara L; Karwacki, Christopher J; Friday, David; Jun 2008; 43 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-BA07PRO104
Report No.(s): AD-A483299; ECBC-TR-621; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483299

Current technology-based efforts are focusing on a nanotechnology approach to sorbent development for air purification applications. Metal-organic frameworks, or MOFs, are one novel class of materials that allow for specific functionalities to be designed directly into a porous framework. This report summarizes the evaluation of four MOFs using nitrogen isotherm data, temperature stability analyses, water and chloroethane adsorption equilibria, and ammonia, cyanogen chloride (CK), and sulfur dioxide breakthrough data.
DTIC
Adsorption; Chemical Warfare; Purification; Toxicity

20080041151 North Carolina State Univ., Raleigh, NC USA
Fabrication of a Lateral Polarity GaN MESFET: An Exploratory Study
Sitar, Zlatko; Collazo, Ramon; Jun 27, 2007; 16 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-06-1-0406
Report No.(s): AD-A483352; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483352

This report describes exploratory studies in the fabrication of the GaN LPH structures and their application in the fabrication of a depletion-mode metal semiconductor field effect transistors (MESFETs). Exploiting LPH growth technology, and the difference in the electronic properties of the different type of domains, i.e. as grown N-polar domains are conductive and Ga-polar domains are insulating, laterally selective doped areas can be realized for improving contact resistance to the conduction channel in GaN MESFETs. Basically, the N-polar domains act as the ohmic contacts to the channel that is localized in a Ga-polar domain.
DTIC
Additives; Fabrication; Field Effect Transistors; Gallium Nitrides; Polarity

20080041162 Johns Hopkins Univ., Laurel, MD USA
Supercritical Fluid Spray Application Process for Adhesives and Primers
Donohue, Marc D; Mar 2003; 207 pp.; In English
Report No.(s): AD-A483397; SERDP-PP-1118; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483397

In this project, we reformulated various solvent borne, high volatile organic compound (VOC) adhesives and adhesive primers, as cited in SERDP's Statement of Need, for application by a supercritical carbon dioxide spray process. Over the last several years, a new spray application process has been developed for polymeric based paints and other coatings that can reduce solvent VOC emissions up to 80%. This process was conceived by the principal investigator of this project and has been commercialized by the Dow Chemical Company. This unique process (known as the UNICARB (trademark) process) is based on the use of supercritical carbon dioxide as a replacement for organic solvents in multi-component spray coating formulations. By adapting this process to adhesives and adhesive primer applications, stringent compliance standards can be achieved respective to environmental, toxicological, materials compatibility, and, physical property performance characteristics as outlined in the original proposal and Statement of Need. Furthermore, by employing this process to apply adhesives that are presently used in the military, the costs incurred for developing and testing new (different) low/no-VOC, non-structural adhesives will be negated.
DTIC
Adhesives; Carbon Dioxide; Sprayers; Supercritical Fluids

20080041279 Air Force Research Lab., Edwards AFB, CA USA

The Effect of Atomic Oxygen on POSS-Polyimides (Preprint)

Tomczak, Sandra J; Wright, Michael E; Guenthner, Andrew J; Petteys, Brian J; Minton, Timothy K; Brunsvold, Amy; Vij, Vandana; McGrath, Laura M; Mabry, Joseph M; May 2008; 16 pp.; In English

Contract(s)/Grant(s): LRIR-92PL0COR; Proj-DARP

Report No.(s): AD-A483535; AFRL-RZ-ED-TP-2008-079; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Kapton(Registered) is ubiquitous in space-structures, yet degrades severely in Low Earth Orbit (LEO) due to reactions with atomic oxygen (AO). Polyhedral oligomeric silsesquioxane (POSS) is a cage-like structure of silicon and oxygen, surrounded by organic groups. Both main-chain (MC) and side-chain (SC) POSS-diamines have been polymerized to form POSS-Kapton-polyimides (POSS-Kapton-PIs) which have comparable resistance to AO. POSS-copolymers form an AO-resistant silica layer upon exposure to AO, which has been identified by X-Ray Photoelectron Spectroscopy (XPS). Images of space-flown MC-POSS-Kapton-PIs, physical properties of both MC-POSS-Kaptons and SC-POSS-Kaptons, and transmission electron micrographs of MC-POSS-Kaptons will be presented.

DTIC

Aerospace Environments; Degradation; Oxygen Atoms; Polyimides; Polymers

20080041284 Army Soldier and Biological Chemical Command, Aberdeen Proving Ground, MD USA

Layering ASZM-TEDA Carbon Beds of Varying Particle Sizes to Optimize Filter Performance

Newton, Richard A; Jones, Paulette; Morrison, Robert W; Jul 1, 2003; 8 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483551; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This research investigated cyanogen chloride (CK) filtration performance and airflow resistance of adsorbent beds consisting of two ASZM-TEDA Carbon layers of different particle size. Adsorbent particle size affects filter performance in two ways: (1) smaller particle size results in increased chemical vapor breakthrough time and (2) larger particle size results in lower airflow resistance. CK was used as a basis for assessing filtration performance because it is a design-limiting agent for NBC filters. The results of the study showed that ASZM-TEDA Carbon beds consisting of an inlet layer of larger particle size followed by a layer of smaller particle size provided a superior trade-off of filtration performance and airflow resistance.

DTIC

Carbon; Chlorides; Cyanogen; Filtration

20080041306 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA

Residual Life Indicator for Physical Adsorption Capacity of NBC Filters. Part 1. Acetone Vapor Pulses and the Effect of Moisture Content on Retention Characteristics

Peterson, Gregory W; Friday, David; Shrewsbury, Marc; Jun 2008; 29 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483608; ECBC-TR-622; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Currently, no method exists to indicate when chemical biological radiological nuclear (CBRN) filters no longer have the capacity to protect the warfighter in the event of a toxic chemical release. The three factors responsible for CBRN filter failure are losses of mechanical integrity, physical adsorption capacity, and of reactive capacity. In this report, data are collected to support the development of a residual life indicator for the remaining physical capacity of a CBRN filter using acetone as a pulsed chemical tracer. Specific areas of focus include relationships between elution characteristics, relative humidity, pre-adsorbed moisture, and pre-adsorbed organic contaminants.

DTIC

Acetone; Adsorption; Moisture; Moisture Content; Radiology; Vapors

20080041438 Hamilton (Pepper), Pittsburgh, PA, USA

Synthesis and Self-Assembly of ABC Triblock Bola Peptide

Stupp, S. I., Inventor; Claussen, R. C., Inventor; Rabatic, B. M., Inventor; 14 Nov 03; 20 pp.; In English

Patent Info.: Filed Filed 14 Nov 03; US-Patent-Appl-SN-10-534 266

Report No.(s): PB2008-103843; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention provides for bola amphiphiles compositions which have more than one lyophilic (hydrophilic) head group and a hydrophobic (hydrophobic) moiety capable of hydrogen bonding with other bola amphiphiles. These bola amphiphiles are capable of self assembling into micelles. The advantage of these bola amphiphiles is that they may self-assemble into micelles whose lyophilic head groups are located within the core and on the surface of the micelles. The

lyophilic environment at the core and on the surface of the micelles may be different and may be controlled by the choice of head group moieties on the bola amphiphiles. The utility of these compositions is that they can be used to load or encapsulate polar drugs, DNA, mineralizable inorganic salts, or other molecules of interest within the polar interior of the micelle. Such compositions may also provide small water-filled ion-conducting channels within their structure suitable for use in micro electromechanical devices, as templates for nanowires or dielectrics, and as chemical sensors.
NTIS
Patent Applications; Peptides; Self Assembly

20080041455 Schwegman, Lundberg, Woessner and Kluth, Minneapolis, Macau
Materials for Processing Non-Aqueous Mixtures and Methods for Their Preparation
Kloos, S. D., Inventor; Schwartz, K., Inventor; Rudie, B., Inventor; 2 Dec 05; 10 pp.; In English
Contract(s)/Grant(s): NIST-70NANB8H4028
Patent Info.: Filed Filed 2 Dec 05; US-Patent-Appl-SN-11-293 869
Report No.(s): PB2008-103573; No Copyright; Avail.: CASI: A02, Hardcopy
The invention provides porous matrices that comprise one or more anionic surfactants that can be used in non-aqueous environments.
NTIS
Patent Applications; Porous Materials

20080041467 Idaho National Lab., Idaho Falls, ID, USA
Understanding the Chemistry of Uncommon Americium Oxidation States for Application to Actinide/Lanthanide Separations
Martin, L. R.; Mincher, B. J.; Schmitt, N. C.; Sep. 2007; 5 pp.; In English
Contract(s)/Grant(s): INL/CON-07-12162
Report No.(s): DE2007-918180; INL/CON-07-12162; No Copyright; Avail.: Department of Energy Information Bridge
A spectroscopic study of the stability of Am(V) and Am(VI) produced by oxidizing Am(III) with sodium bismuthate is presented, varying the initial americium concentration, temperature and length of the oxidation was seen to have profound effects on the resultant solutions.
NTIS
Actinide Series; Americium; Oxidation

20080041475 Air Force Research Lab., Hanscom AFB, MA USA
Design of a Tunable, Room Temperature, Continuous-Wave Terahertz Source and Detector using Silicon Waveguides
Baehr-Jones, T; Hochberg, M; Soref, Richard; Scherer, A; Jan 30, 2008; 9 pp.; In English
Contract(s)/Grant(s): Proj-2305
Report No.(s): AD-A483348; AFRL-RY-HS-TP-2008-0011; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483348
We describe the design of a silicon-based source for radiation in the 0.5-14 THz regime. This new class of devices will permit continuously tunable, milliwatt scale, cw, room temperature operation, a substantial advance over currently available technologies. Our silicon terahertz generator consists of a silicon waveguide for near-infrared radiation, contained within a metal waveguide for terahertz radiation. A nonlinear polymer cladding permits two near-infrared lasers to mix, and through difference-frequency generation produces terahertz output. The small dimensions of the design greatly increase the optical fields, enhancing the nonlinear effect. The design can also be used to detect terahertz radiation.
DTIC
Continuous Radiation; Frequencies; Lasers; Room Temperature; Silicon; Waveguides

20080041625 Stanford Univ., Stanford, CA USA
Exploratory Study to Determine the Ignition Properties and Combustion Chemistry of Explosives Using Shock Tube Methods
Davidson, D F; Hanson, R K; Jan 31, 2008; 20 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-07-1-0123
Report No.(s): AD-A483801; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483801
We investigated the potential of a new experimental method for combustion studies of solid nano-particle energetic

materials. This new method is based on the recent development in our laboratory of an aerosol shock tube and its combined use with laser extinction (for characterization of particle size and loading) and absorption diagnostics (for characterization of vapor species). We accomplished three main objectives in this study: 1) we demonstrated the ability to load significant amounts of solid materials into our aerosol carrier and deliver this aerosol into our shock tube; 2) we demonstrated laser-based diagnostic measurements of several key aspects of the ignition process of solid/liquid fuel systems; and 3) we characterized the effect of the addition of aluminum nano-particles on n-dodecane ignition under conditions previously not studied.
DTIC
Aerosols; Aluminum; Combustion Chemistry; Explosives; Fuels; Ignition; Nanostructures (Devices); Shock Tubes

20080041631 Rutgers - The State Univ., Piscataway, NJ USA
Molecular Design of Sulfonated Triblock Copolymer Permselective Membranes
Vishnyakov, Aleksey; Neimark, Alexander V; Jul 3, 2008; 39 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-07-1-0048
Report No.(s): AD-A483821; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483821

Search for novel polymeric electrolyte membranes (PEM) suitable as permselective diffusion barriers is one of the key problems in engineering new protective materials. The goal of the project was to get a better understanding of the physical and chemical factors governing sorption and permeability of phosphoorganic agents in PEM made of sulfonated triblock copolymers of styrene and lower olefins by means of multiscale molecular simulations. These materials are of special interest to the Army as low-cost substitutes of expensive Nafion-type membranes. Concentrating on sulfonated polystyrene containing block-copolymers, we developed a hierarchical multiscale methodology for computational studies of the membrane morphology at environmental conditions, and the membrane sorption and transport properties with respect to water and nerve gas simulant dimethylmethylphosphonate (DMMP). The methods developed include: 1) quantum mechanical ab-initio calculations of specific interactions of DMMP and water with the membrane fragments, 2) atomistic molecular dynamic simulations of membrane solvation in water-DPPM mixture with different counterions, 3) large-scale molecular dynamic simulations of membrane segregation and mobilities of chemicals, and 4) dissipative particle dynamics simulations of mesoscopic morphologies in solvatedmembranes of different composition. The molecular simulation studies were performed in concert with the experimental work at Natick Soldier, RDEC, Natick, MA.
DTIC
Block Copolymers; Copolymers; Electrolytes; Membranes; Permeability

20080041633 New Jersey Inst. of Tech., Newark, NJ USA
Thermochemistry and Kinetics for Designer Molecules Additives to Energetic Materials for Improved Performance: Thermal Generation of Hydrazine
Cole, John; da Silva, Gabriel; Bozzelli, Joseph W; Anderson, William; Sep 28, 2007; 13 pp.; In English
Contract(s)/Grant(s): W911NF-07-1-0106
Report No.(s): AD-A483824; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483824

A number of JANNAF publications have illustrated the remarkable performance modification that the addition of Tag-ZT can have in formulations of energetic materials, where the Tag-ZT additive resulted in significant improvement in performance the energetic material. Recent studies in the research lab or Dr. Rich Behrens have demonstrated that the thermal reaction of TAG-ZT results in formation of hydrazine, N2H4. The Behrens group further evaluate the hydrazine to be a primary contributor to the beneficial results of the TAG ZT additive. This study identifies a number of common N2H3 containing hydrocarbons, determines their thermochemistry and kinetic parameters for dissociation to a hydrocarbon and hydrazine using computational chemistry. Experimental studies are suggested for verification of the results and for modelers to identify desired molecular formulations for the NJIT group to target structures that match the needed properties.
DTIC
Additives; Computational Chemistry; Explosives; Hydrazines; Kinetics; Molecules; Thermochemistry

20080041647 Rice Univ., Houston, TX USA

High Yield Methods for Cutting Single-Walled Carbon Nanotubes

Gu, Zhenning; Ziegler, Kirk J; Schmidt, Howard K; Chen, Zheyi; Rauwald, Urs; Hauge, Robert H; Smalley, Richard E; Tour, James M; May 13, 2008; 37 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-04-1-0452

Report No.(s): AD-A483847; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483847

Methods for cutting single-walled carbon nanotubes (SWNTs) to controlled lengths for material, biological and electronic applications are being developed. The research aims at establishing scalable cutting processes for preparing high quality short SWNTs with high yield, systematic procedure for evaluating the cutting results, and effective, scalable methods for length sorting of cut SWNTs. Caro's acid has been studied and chosen as the finishing cutting reagent. High temperature fluorination plus Caro's acid have been developed as our primary cutting method. Electron beam irradiation of ozonated SWNTs has shown promising cutting result. A standard procedure has been developed to individualize SWNT samples and to determine the length distribution. Preliminary results have indicated that phase separation technique could be a scalable, efficient means for length sorting of SWNTs. Ultra-short SWNTs (US-SWNTs) were produced by oxidation in oleum using fuming nitric acid. DTIC

Carbon Nanotubes; Cutting

20080041662 California Univ., San Diego, La Jolla, CA USA

Dissociative Recombination Chemistry and Plasma Dynamics

Continetti, Robert E; Jun 16, 2008; 16 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-04-1-0035

Report No.(s): AD-A483875; UCSD-2007-0071; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483875

Advances made in the study of the dissociation dynamics and product branching ratios of energized transient neutral molecules formed by charge-transfer (DCE) and recombination of cations with free electrons (DR) are reviewed. The results obtained include detailed measurements of the three-body dissociation of H3, O4 and sym-triazine (HCN)3, as well as the product branching ratios for the two-body dissociation of CM5+ and M30+. These results have significance for a number of Air Force applications, one including ion-assisted ignition and combustion for hypersonic vehicle applications. This project aimed to extend our knowledge of the fate of transient neutrals produced in plasma environments while providing fundamental new information on the dynamics of two- and three-body dissociation processes. As noted below, significant successes in the study of DCE processes were achieved, while the efforts at carrying out DR measurements on the last-ion-beam apparatus were not successful.

DTIC

Dissociation; Plasma Dynamics; Recombination Reactions

20080041679 Pennsylvania State Univ., University Park, PA USA

An Integrated Ignition and Combustion System for Liquid Propellant Micro Propulsion

Yetter, Richard A; Yang, Vigor; Aksay, I A; Jun 26, 2008; 19 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-06-1-0183

Report No.(s): AD-A483931; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483931

Liquid monopropellant microthrusters utilizing electrolytic ignition were designed, fabricated, and analyzed. Low temperature co-fired ceramic tape technologies were used initially to fabricate microscale burners in order to evaluate the applicability of the technology to high temperature combustion systems. Microscale diffusion flames were stabilized in the burners, and optical spectroscopy measurements were performed to characterize the flame behavior. The low temperature co-fired ceramic tape technologies were then applied to the fabrication of microthrusters. The microthrusters had integrated silver electrodes to enable ignition of hydroxylammonium nitrate based liquid monopropellants by electrolytic decomposition. The volume of the thruster combustion chamber was 0.82 mm3. The microthruster was successfully ignited, and a thrust output of approximately 200 mN was measured with a voltage input of 45 V. Energy input as small as 1.9 J was achieved for ignition, and ignition delay as short as 224.5 ms was recorded.

DTIC

Ceramics; Combustion; Ignition Systems; Liquid Rocket Propellants; Microrocket Engines; Miniaturization; Propulsion; Spacecraft Propulsion; Systems Integration

20080041690 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA

Why Is Ring Strain Alone Unable to Fully Explain the Rate Accelerations of Oxirane and Thiirane in Nucleophilic Substitution

Banks, Harold D; Jul 1, 2003; 12 pp.; In English

Report No.(s): AD-A483956; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483956

Nucleophilic substitution has long been recognized as one of the most important reactions in synthetic organic chemistry. Because of their predictable regio- and stereochemistry, reactions proceeding through the SN2 mechanism have received considerable attention. The ease of displacement of the leaving group plays a significant role in determining the reactivity of a given substrate; however, even compounds that contain extremely poor leaving groups such as ethers, amines or thioethers are reactive and synthetically useful if these functional groups are structured in such a manner that the heteroatom is incorporated into a three- or four-membered ring. Relief of ring strain in the transition state is typically cited as the sole source of the increased reactivity of heterocycles with nucleophiles relative to acyclic analogs. Over a decade ago, however, it was noted that ring strain alone is insufficient to account entirely for rate increases in SN2 reactions relative to suitably chosen acyclic model compounds. Lillocci found the rate of the cleavage reaction of an aziridinium triflate with acetonitrile in the presence of N-ethyldiisopropylamine to be at least 103 times faster than that of the corresponding azetidinium salt in spite of similar ring strain energies. This phenomenon has also been observed in nucleophilic cleavage of these ions by sodium methoxide. In a related reaction, Stirling observed that the rate of ring cleavage of cyclopropanols under basic conditions was considerably faster than that of cyclobutanols. Recently, Hoz recognized that an additional factor, as yet uncharacterized, must be included to explain the high computed reactivity of anionic nucleophiles with 3-membered relative to 4-membered heterocycles.

DTIC

Nuclear Reactions; Nucleophiles; Organic Chemistry; Substitutes

20080041698 Georgia Inst. of Tech., Atlanta, GA USA

Synthesis and Processing of Ultra-High Temperature Metal Carbide and Metal Diboride Nanocomposite Materials

Speyer, Robert F; Apr 15, 2008; 17 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0140

Report No.(s): AD-A483979; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483979

Zirconium diboride and a zirconium diboride/tantalum diboride mixture were synthesized by solution-based processing. Zirconium n-propoxide was refluxed with 2,4-pentanedione to form zirconium diketonate. This compound hydrolyzed in a controllable fashion to form a zirconia precursor. Spherical particles of 200-600 nm for pure ZrB2 and ZrB2-TaB2 mixtures were formed. Commercial powders of ZrB2 containing various concentrations of B4C, SiC, TaB2, and TaSi2 were pressureless-sintered and post-HIPed to their theoretical densities. Oxidation resistances were studied by scanning thermogravimetry over the range 1150-1550 deg C. SiC additions improved oxidation resistance over a broadening range of temperatures with increasing SiC content. Tantalum additions to ZrB2-B4C-SiC in the form of TaB2 and/or TaSi2 increased oxidation resistance over the entire evaluated spectrum of temperatures. TaSi2 proved to be a more effective additive than TaB2. Silicon-containing compositions formed a glassy surface layer, covering an interior oxide layer. This interior layer was less porous in tantalum-containing compositions.

DTIC

Borides; Carbides; Nanocomposites; Oxidation Resistance; Powder (Particles); Zirconium; Zirconium Compounds

20080041699 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA

(27)Al, (47,49)Ti, (31)P, and (13)C MAS NMR Study oF VX, GB, GD and HD Reactions With Nanosize Al2O3, Al2O3, TiO2, Aluminum And Titanium

Wagner, George W; Procell, Lawrence R; Munavalli, Shekar; Jul 1, 2003; 8 pp.; In English

Report No.(s): AD-A483986; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483986

Assorted reactions of VX, GB, GD and HD with Al2O3, TiO2 (anatase and rutile), aluminum and titanium metal powders have been studied by 27Al, 47,49Ti, 31P and 13C MAS NMR. VX, GB, GD and HD hydrolyze on both nanosize and conventional Al2O3. A significant droplet size effect on the reaction kinetics is observed. For VX, GB and GD, 27Al and 31P MAS NMR detect the formation of stable, precipitated aluminum phosphonate complexes, which would be environmentally-persistent. Similarly, GD hydrolysis on TiO2 yields titanium phosphonate species as detected by 31P MAS NMR. Attempts

at obtaining 47,49Ti NMR spectra of these species and those of titanium phosphonate model compounds were marginally successful. 47,49Ti NMR spectra were obtainable for anatase, rutile and titanium metal; thus severe quadrupolar linebroadening is suspected for the titanium phosphonate complexes. GD reacted with aluminum and titanium powder in the presence of water results in acid-dissolution of the metals and the formation of their respective metal phosphonates.
DTIC
Aluminum; Aluminum Oxides; Nuclear Magnetic Resonance; Titanium; Titanium Compounds; Titanium Oxides

20080041700 Cornell Univ., Ithaca, NY USA
Characterization of the Aerobic Oxidation of cis-Dichloroethene and Vinyl Chloride in Support of Bioremediation of Chloroethene-Contaminated Sites
Gossett, James M; Mattes, Timothy E; Sills, Deborah L; Spain, Jim C; Nishino, Shirley F; Coleman, Nicholas V; Nov 5, 2004; 144 pp.; In English
Contract(s)/Grant(s): Proj-CU-1168
Report No.(s): AD-A483994; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483994

The lesser chlorinated ethenes, cis-1,2-dichloroethene (cDCE) and vinyl chloride (VC), are produced by anaerobic reductive dechlorination at subsurface sites contaminated by tetrachloroethene (PCE) and trichloroethene (TCE). Accumulation of VC and cDCE under anaerobic conditions limits the application of natural attenuation and enhanced reductive anaerobic biological in-situ treatment technologies (RABITT). Aerobic degradation of lesser chlorinated ethenes has been demonstrated, suggesting that sequential anaerobic/aerobic conditions may result in complete mineralization of PCE/TCE. However, our present understanding of the aerobic transformation potentials of cDCE and VC is limited, thus limiting the reliability of and confidence in natural and enhanced biological alternatives for site remediation. The objective of our project was to determine the prevalence and metabolic capabilities of microorganisms able to derive energy from aerobic oxidation of cDCE and/or VC in subsurface environments. The results help delineate the role of growth-coupled (vs. cometabolic) aerobic oxidation in the natural attenuation of lesser-chlorinated ethenes. Results provide the basis for improved site assessment, improved remedial-action decision-making, and more reliable bioremediation technologies. Our findings indicate that aerobic bacteria (Mycobacterium and Nocardioides strains) capable of growth-linked VC oxidation are widespread in the environment, and commonly found at chlorinated-ethene-contaminated sites. Aerobic assimilation of VC as a carbon source is therefore an ecologically significant phenomenon of equal or greater importance than cometabolic VC degradation. Based on their distribution, growth rates and kinetic parameters, we believe that Mycobacterium strains are most likely to be responsible for the aerobic natural attenuation of VC that has been observed at many sites.
DTIC
Aerobes; Bacteria; Chlorides; Chlorination; Contamination; Oxidation; Vinyl Radical; Waste Treatment

20080041701 Michigan Univ., Ann Arbor, MI USA
Nonlinear Nano-Optics: Probing One Exciton at a Time
Bonadeo, N H; Chen, Gang; Gammon, D; Katzer, D S; Park, D; Steel, D G; Sep 28, 1998; 5 pp.; In English
Report No.(s): AD-A483997; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483997

Coherent nonlinear optical spectroscopy of individual excitons in GaAs quantum dots is demonstrated and shows strong similarities with atoms in their coherent optical interaction, unlike higher dimensional heterostructures. The nonlinear response is dominated by an incoherent contribution (saturation) and a coherent contribution (population pulsations) of the single dot and compares well with present theory. The data shows that energy relaxation and dephasing rates are comparable, reflecting the absence of significant pure dephasing, and also demonstrate the presence of interdot energy transfer.
DTIC
Excitons; Gallium Arsenides; Nonlinearity; Optical Properties; Quantum Dots

20080041706 Naval Observatory, Washington, DC USA
Kalman Filter Characterization of Cesium Clocks and Hydrogen Masers
Breakiron, Lee A; Dec 2002; 17 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484008; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484008

Our previous PTTI paper demonstrated that a two-state Kalman filter involving the parameters frequency and frequency

drift, when properly implemented, produces frequencies for hydrogen masers that generate a stable mean timescale, at least for cases involving simulated and low-noise real data. The current paper extends the investigation to the noisier data actually employed in the USNO operational timescale. Results for about 500 days of postprocessed data for 12 masers and 51 cesium clocks indicate comparable frequency stabilities to those obtained with the currently operational timescale algorithm.
DTIC
Cesium; Clocks; Hydrogen; Hydrogen Masers; Kalman Filters; Masers

20080041712 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA
Chemical-Material Compatibility Study With Initial Decon Green Formulation
Bartram, Philip W; Gibson, Monicia R; Henderson, Vikki D; Jul 1, 2003; 10 pp.; In English
Report No.(s): AD-A484049; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484049

The army is currently developing Decon Green, a thorough decontaminant intended to be more effective, environmentally friendly, applicable to an extreme temperature range, and more material-compatible than the standard decontaminant DS2. The objective of this study was to compare the effects of Decon Green on thermoplastics and rubbers of military interest with the effects caused by DS2. These effects were observed by comparing physical properties of test specimens before and after exposure to both decontaminants. Percent weight gain, percent extraction, solubility corrected for extraction, rate of decontaminant sorption, and changes in hardness, appearance and volume were noted. It was found that DS2 affected materials to a greater degree than Decon Green.
DTIC
Chemical Compatibility; Decontamination; Thermoplastic Resins

20080041722 Groundwater Services, Inc., Houston, TX USA
Low-Volume Pulsed Hydrogen Biosparging
Oct 7, 2003; 121 pp.; In English
Report No.(s): AD-A484076; G-2535; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484076

The purpose of this research was to investigate the efficacy of bioaugmentation and hydrogen biosparging for stimulating reductive dechlorination of a simulated dissolved PCE plume and a PCE DNAPL source area. In addition, hydrogen gas delivery radius and persistence were examined under different conditions to shed light on suitable sparging conditions in the field.
DTIC
Hydrogen; Plumes; Soils

20080041803 Naval Research Lab., Washington, DC USA
Deep Level Transient Capacitance Measurements of GaSb Self-Assembled Quantum Dots
Magno, R; Bennett, Brian R; Glaser, E R; Nov 15, 2000; 8 pp.; In English
Report No.(s): AD-A484140; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Deep level transient spectroscopy (DLTS) measurements have been made on GaAs n(+)p diodes containing GaSb self-assembled quantum dots and control junctions without dots. The self-assembled dots were formed by molecular beam epitaxy using the Stranski-Krastanov growth mode. The dots are located in the depletion region on the p side of the junction where they act as a potential well that may capture and emit holes. Spectra recorded for temperatures between 77 and 440 K reveal peaks in diodes containing dots. A control sample with a GaSb wetting layer was found to contain a single broad high temperature peak that is similar to a line found in the GaSb quantum dot samples. No lines were found in the spectra of a control sample prepared without GaSb. DLTS profiling procedures indicate that one of the peaks is due to a quantum-confined energy level associated with the GaSb dots while the others are due to defects in the GaAs around the dots. The peak identified as a quantum-confined energy level shifts to higher temperatures and its intensity decreases on increasing the reverse bias. The activation energy for the quantum-confined level increases from 400 meV when measured at a low reverse bias to 550 meV for a large reverse bias. Lines with activation energies of 400, 640, and 840 meV are associated with defects in the GaAs based on the bias dependence of their peak positions and amplitudes.
DTIC
Antimony; Antimony Compounds; Capacitance; Gallium; Gallium Antimonides; Gallium Compounds; Measurement; Quantum Dots; Self Assembly

20080041847 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

The Effect of Radiation on the Electrical Properties of Aluminum Gallium Nitride/Gallium Nitride Heterostructures

McClory, John W; Jun 2008; 176 pp.; In English

Report No.(s): AD-A484237; AFIT/DS/ENP/08-01; No Copyright; Avail.: Defense Technical Information Center (DTIC)

AlGaN/GaN Heterojunction Field Effect Transistors (HFETs) were irradiated at low temperature and the temperature dependent changes to drain current, gate current, capacitance, and transconductance were measured. The results were compared to the charge control model of the drain current and trap-assisted tunneling model of the gate current to determine the source of the radiation-induced changes. AlGaN/GaN HFETs demonstrated threshold voltage shifts and drain current changes after irradiation. After electron and neutron irradiation applied at ~80 K, measurement of the drain current at this temperature showed an increase that saturated after 10^13 electrons/cm^2 or 10^10 neutrons/cm^2 due to positive charge build-up in the AlGaN layer. Measurement at room temperature after low-temperature irradiation showed a decrease in drain current due to the build up of charged defects along the AlGaN-GaN interface that decrease the mobility in the 2DEG and hence decrease the current. Gate leakage currents increased after low temperature irradiation and the increase was persistent after room temperature annealing. The increased leakage current was attributed to trap-assisted tunneling after application of the trap-assisted tunneling model. Comparison of the model to post-irradiation vs. pre-irradiation data showed that the dominant parameter change causing increased gate current was an increase in trap concentration.

DTIC

Aluminum Nitrides; Electrical Properties; Gallium Nitrides; Radiation Effects

20080041876 Michigan Univ., Ann Arbor, MI USA

Defects Associated with Soldification of Melt Processed Superalloys for the Aerospace Industry

Pollock, Tresa; Voorhees, Peter; Jul 23, 2008; 19 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-0104; FA9550-05-1-0089

Report No.(s): AD-A484310; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This Materials Engineering for Affordable New Systems (MEANS) program centered on developing an integrated computational framework for predicting the conditions under which turbine blades can be produced that are free of deleterious solidification defects. To achieve this ambitious goal we studied the solidification process over length scales from subnanometer to millimeter with the goal of producing a theory for defect formation. Three dimensional datasets have been acquired to study the details of the fluid flow process. Close interaction with industry was essential to ensure the resulting computational model will be in a form that is usable in their efforts to design new alloys and processing routes. Given the broad research focus of the project the MEANS team was composed of engineers and scientists from government laboratories, industry, and universities and is diverse in its research expertise.

DTIC

Aerospace Industry; Defects; Heat Resistant Alloys; Solidification

20080042035 Air Force Research Lab., Edwards AFB, CA USA

Design of Energetic Ionic Liquids

Boatz, Jerry A; Gordon, Mark S; Voth, Gregory A; Hammes-Schiffer, Sharon; May 7, 2008; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-2303

Report No.(s): AD-A483697; AFRL-RZ-ED-TP-2008-183; No Copyright; Avail.: Defense Technical Information Center (DTIC)

An essential need of the US Air Force is the discovery, development, and fielding of new, energetic materials for advanced chemical propulsion in space and missile applications. Some of the key factors driving the requirement for new chemical propellants include: (a) improved performance in terms of increased specific impulse and density, (b) reduced sensitivity to external stimuli such as impact, friction, shock, and electrostatic discharge, and (c) mitigation of environmental and toxicological hazards (and the resulting costs) associated with currently used propellants. The overall objective of the Design of Energetic Ionic Liquids challenge project is to address several key technical issues and challenges associated with the characterization, design, and development of ILs as new monopropellants. Among these, for example, are a fundamental understanding of the (in)stability of ILs, the intrinsic nature of the short- and long-range structure and interactions between the component ions, and identification of the key steps in the initial stages of decomposition and combustion. A hierarchy of computational approaches is employed, including atomistic, high-level quantum chemical methods applied to individual ions

and ion clusters, condensed phase atomistic molecular dynamics simulations utilizing polarizable force fields, and mesoscale-level simulations of bulk ionic liquids based upon multiscale coarse graining techniques.
DTIC
Liquids; Monopropellants; Quantum Chemistry

20080042042 Savannah River National Lab., Aiken, SC, USA
In-situ Monitoring of Corrosion during a Laboratory Simulation of Oxalic Acid Chemical Cleaning
Wiersma, B. J.; Mickalonis, J. I.; Beam, D. C.; Poirier, M. R.; Herman, D. T.; Oct. 2007; 26 pp.; In English
Contract(s)/Grant(s): DE-AC09-96SR18500
Report No.(s): DE2007-918136; WSRD-STI-2997-00560; No Copyright; Avail.: National Technical Information Service (NTIS)

The Savannah River Site (SRS) will disperse or dissolve precipitated metal oxides as part of radioactive waste tank closure operations. Previously SRS used oxalic acid to accomplish this task. To better understand the conditions of oxalic acid cleaning of the carbon steel waste tanks, laboratory simulations of the process were conducted to determine the corrosion rate of carbon steel and the generation of gases such as hydrogen and carbon dioxide. Open circuit potential measurements, linear polarization measurements, and coupon immersion tests were performed in-situ to determine the corrosion behavior of carbon steel during the demonstration. Vapor samples were analyzed continuously to determine the constituents of the phase. The combined results from these measurements indicated that in aerated environments, such as the tank, that the corrosion rates are manageable for short contact times and will facilitate prediction and control of the hydrogen generation rate during operations.
NTIS
Carbon Steels; Chemical Cleaning; Corrosion; Corrosion Resistance; Hydrogen; Oxalic Acid; Radioactive Wastes; Simulation

20080042045 Washburn (Woodcodk), LLP, Philadelphia, PA, USA
Practical Pulse Synthesis Via the Discrete Inverse Scattering Transform
Epstein, C. L., Inventor; Magland, J., Inventor; 12 Dec 03; 38 pp.; In English
Contract(s)/Grant(s): ECS-0313143
Patent Info.: Filed Filed 12 Dec 03; US-Patent-Appl-SN-10-538 361
Report No.(s): PB2008-102507; No Copyright; Avail.: CASI: A03, Hardcopy

The discrete inverse scattering (DIST) approach is used to design selective RF pulses. As in SLR, a hard pulse approximation is used to actually design the pulse. Unlike SLR, the pulse is designed using the full inverse scattering data (the reflection coefficient and the bound states) rather than the flip angle profile. The reflection coefficient is approximated in order to obtain a pulse with a prescribed rephasing time. In contrast to the SLR approach, direct control on the phase of the magnetization profile is retained throughout the design process. Explicit recursive algorithms are provided for computing the hard pulse from the inverse scattering data. These algorithms are essentially discretizations of the Marchenko equations. When bound states are present, both the left and right Marchenko equations are used in order to improve the numerical stability of the algorithm. The DIST algorithm is used in prefer-red applications to generate pulses for use in magnetic resonance imaging, although it has applications in other two-level quantum systems such as quantum computing and spintronics.
NTIS
Inverse Scattering; Patent Applications; Radio Frequencies

20080042064 Air Force Research Lab., Edwards AFB, CA USA
Polynitrogen/Nanoaluminum Surface Interactions (Challenge Project C2V)
Boatz, Jerry A; Sorescu, Dan C; May 8, 2008; 8 pp.; In English
Contract(s)/Grant(s): Proj-2303
Report No.(s): AD-A483678; AFRL-RZ-ED-TP-2008-182; No Copyright; Avail.: Defense Technical Information Center (DTIC)

First-principles density functional theory (DFT) calculations using the generalized gradient approximation (GGA) have been performed to study the adsorption of a series of all-nitrogen and high-nitrogen compounds of increasing sizes and complexity on the Al(111) surface. The calculations employ periodic slab models with 4 Al layers, ranging in size from (3x3) to (6x6) surface unit cells, and containing up to 144 Al atoms. Complementary quantum chemical calculations, utilizing DFT and second-order perturbation theory methods, of the ground state potential energy surfaces of the corresponding

polynitrogen/high nitrogen species in the absence of the aluminum surface also have been performed. The initial set of studies performed in the first year of this challenge project, which focused on the adsorption and reaction properties of Nx (x=1-5), NHx (x=1-3), N2Hx (x=1-4), N3H, N3H3 and N4H4 species on Al(111), have been extended to include larger polynitrogen systems such as N6, N8, N10 and N12.
DTIC
Aluminum; Nitrogen; Surface Reactions

20080042156 Myers Bigel Sibley and Sajovec, Raleigh, NC, USA
Metal Complexation of 1-Acyldipyrromethanes and Porphyrins Formed Therefrom
Lindsey, J. S., Inventor; Muthukumaran, K., Inventor; Duddu, S. S., Inventor; Muresan, A. Z., Inventor; Youngblood, W. J., Inventor; 23 Dec 04; 23 pp.; In English
Contract(s)/Grant(s): GM362238
Patent Info.: Filed Filed 23 Dec 04; US-Patent-Appl-SN-11-020 901
Report No.(s): PB2008-104507; No Copyright; Avail.: CASI: A03, Hardcopy

A first aspect of the invention is a method of making a porphyrin-metal complex, comprising: (a) providing a first reagent selected from the group consisting of 1-acyldipyrromethanes, 1-acyldipyrrins, dipyrromethane-1-carbinols 1,9-diacyldipyrromethanes and 1,9-diacyldipyrrins; and then (b) condensing the first reagent with either itself (in the case of 1-acyldipyrromethanes, 1-acyldipyrrins, and dipyrromethane-1-carbinols) or a dipyrromethane (in the case of 1,9-diacyldipyrromethanes and 1,9-diacyldipyrrins) in a reaction mixture comprising a solvent and a second reagent selected from the group consisting of palladium and copper complexes to produce the porphyrin-metal complex (with the metal being palladium or copper). In preferred embodiments of the foregoing, the reaction mixture further comprises a base such as KOH or NaH.
NTIS
Complex Compounds; Patent Applications; Porphyrins

20080042189 Southwest Research Inst., San Antonio, TX USA
Effects of Various Corrosion Inhibitors/Lubricity (CI/LI) on Fuel Filtration Performance
Bessee, Gary B; Mar 2008; 29 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484359; TFLRF-394; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Research had been performed by an industry cooperative program determining the effects of various military aviation fuel additives on filtration performance. One of the conclusions of this research was DCI 4A corrosion inhibitor has detrimental effects on water separation performance of fuel-water separators. The objective of this project was to verify previous research's conclusions that DCI 4A corrosion inhibitor caused detrimental water removal effects. API/IP 1581 5th Edition C-model filter-water separators were evaluated using DCI 4A corrosion inhibitor at 15, 10, 5, and 0 mg/L with duplicates at 5 and 0 mg/L. All data supports the conclusion that the lower the DCI 4A corrosion inhibitor concentration, the less impact this additive has on water separation performance. Results with only static dissipater (Stadis 450) and fuel system icing inhibitor (Di-egme) generate on specification data similar to Jet A that contains no additives.
DTIC
Additives; Corrosion Prevention; Filtration

20080042266 Evan Law Group, LLC, Chicago, IL, USA
Macroporous Structures for Heterogeneous Catalyst Support
Sung, I. K., Inventor; Kim, D. P., Inventor; Kenis, P. J. A., Inventor; 23 Dec 04; 15 pp.; In English
Contract(s)/Grant(s): DAAD19-01-1-0582
Patent Info.: Filed Filed 23 Dec 04; US-Patent-Appl-SN-11-022 281
Report No.(s): PB2008-103934; No Copyright; Avail.: CASI: A03, Hardcopy

A catalyst support comprises a monolithic non-oxide material having a surface area per unit volume of at least 10(5 sup) m(sup 2)/m(sup 3), and a pressure drop of at most 0.25 atm/mm.
NTIS
Catalysts; Heterogeneity; Porous Materials

20080042318 Brookhaven National Lab., Upton, NY USA
Platinum- and Platinum Alloy-Coated Palladium and Palladium Alloy Particles and Uses Thereof
Adzic, R., Inventor; Zhang, J., Inventor; Mo, Y., Inventor; Vukmirovic, M. B., Inventor; 22 Dec 04; 14 pp.; In English
Contract(s)/Grant(s): DE-AC02-98CH10886

Patent Info.: Filed Filed 22 Dec 04; US-Patent-Appl-SN-11-019 759
Report No.(s): PB2008-104320; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention relates to particle and nanoparticle composites useful as oxygen-reduction electrocatalysts. The particle composites are composed of a palladium or palladium-alloy particle or nanoparticle substrate coated with an atomic submonolayer, monolayer, bilayer, or trilayer of zerovalent platinum atoms. The invention also relates to a catalyst and a fuel cell containing the particle or nanoparticle composites of the invention. The invention additionally includes methods for oxygen reduction and production of electrical energy by using the particle and nanoparticle composites of the invention.
NTIS
Coatings; Electrocatalysts; Fuel Cells; Nanoparticles; Oxygen; Palladium Alloys; Patent Applications; Platinum Alloys

20080042327 Kirkpatrick and Lockhart Nicholson Graham LLP, Pittsburgh, PA, USA
Fluorous Tagging and Scavenging Reactant and Methods of Synthesis and Use Thereof
Zhang, W., Inventor; Luo, Z., Inventor; 24 Jan 06; 45 pp.; In English
Contract(s)/Grant(s): NIH-1R44GM67326-01; NIH-1R43GM066415-01
Patent Info.: Filed Filed 24 Jan 06; US-Patent-Appl-SN-11-338 378
Report No.(s): PB2008-104293; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention includes methods and compositions for increasing the fluorous nature of an organic compound by reacting it with at least one fluorous compound to produce a fluorous tagged organic compound. The increased fluorous nature of the fluorous tagged organic compound can then be utilized to separate the fluorous organic compound from untagged reagents, reactants, catalysts and/or products derived therefrom. The resultant fluorous tagged organic compound can be subjected to subsequent chemical transformations, wherein the fluorous nature of the tagged compound is utilized to increase the ease of separation of the fluorous tagged organic compound from untagged reagents, reactants, catalysts and/or products derived therefrom, after each chemical transformation. The chemical transformations result in a second fluorous tagged organic compound wherein the fluorous nature of the second fluorous tagged organic compound can then be reduced by removing the fluorous group therefrom, thereby producing a second organic compound that may be employed as a pharmaceutical compound or intermediate, or a combinatorial library component.
NTIS
Marking; Organic Compounds; Patent Applications; Scavenging

20080042347 National Inst. of Standards and Technology, Gaithersburg, MD, USA
Statistical Analysis of Type S Thermocouple Measurements on the International Temperature Scale of 1990
Guthrie, W. F.; Croarkin, M. C.; Burns, G. W.; Strouse, G. F.; Marcarino, P.; January 2007; 6 pp.; In English
Report No.(s): PB2008-104258; No Copyright; Avail.: CASI: A02, Hardcopy

Data collected by scientists from eight national laboratories were used to estimate the differences between temperatures on the International Temperature Scale of 1990 and the International Practical Temperature Scale of 19658, Amended Edition of 1975 between 630.615 degrees C and 1064.18 degrees C. A new reference function for type S thermocouples was determined for the temperature range -50 degrees C to 1064.18 degrees C. The new reference function was combined with two other reference functions for temperatures between 1064.18 degrees C and 1768.1 degrees C to provide a complete set of reference functions on ITS-90 for type S thermocouples. This paper describes the reference functions and statistical analyses used to estimate differences between the two temperature scales. Issues addressed include: variability within laboratories, form of the new reference functions, and the uncertainty associated with the reference functions.
NTIS
Statistical Analysis; Temperature Scales; Thermocouples

20080042348 Wood, Phillips, Katz, Clark and Mortimer, Chicago, IL, USA
Crystal Refining Technologies by Controlled Crystallization
Shi, Y., Inventor; Liang, B., Inventor; Hartel, R. W., Inventor; 21 Nov 05; 31 pp.; In English
Contract(s)/Grant(s): USDA-2001-35503-10815
Patent Info.: Filed Filed 21 Nov 05; US-Patent-Appl-SN-11-284 531
Report No.(s): PB2008-104134; No Copyright; Avail.: CASI: A03, Hardcopy

A method is provided for making large, uniform and individual crystals from aqueous solutions including the steps of obtaining a concentrated aqueous solution by means of evaporation; rapidly cooling the solution from a post-evaporation high temperature to a first lower temperature, wherein the first lower temperature is lower than the post-evaporation high

temperature and further wherein the first lower temperature is an isothermal crystallization temperature of said solution; generating a batch of initial nuclei by inducing nucleation at the first lower temperature and starting crystal growth; uniformly spreading the initial nuclei into a bulk solution; maintaining simultaneous and rapid growth of crystals from the nuclei at the first lower temperature for a predetermined length of time; continuing the growth of the crystals to produce large, uniform and individual crystals for a predetermined length of time at a temperature that varies gradually from between a first lower temperature to a second lower temperature, wherein the second lower temperature is a temperature lower than the first lower temperature and further wherein the second lower temperature is an end temperature of crystallization; and recovering the large, uniform and individual crystals. Parameters and a system for producing lactose monohydrate crystals using the method are also provided.
NTIS
Crystallization; Crystals; Patent Applications; Refining

20080042362 Bartony and Hare, Pittsburgh, PA, USA
Stabilization of Antioxidants (PAT-APPL-11-288 925)
Lele, B. S., Inventor; Russell, A. J., Inventor; 29 Nov 05; 18 pp.; In English
Patent Info.: Filed Filed 29 Nov 05; US-Patent-Appl-SN-11-288 925
Report No.(s): PB2008-103577; No Copyright; Avail.: CASI: A03, Hardcopy

A composition includes at least one antioxidant moiety and at least one UV-absorbing moiety. The antioxidant moiety and the UV-absorbing moiety are maintained in proximity to each other. The UV-absorbing moiety and the antioxidant moiety can, for example, be attached to a common entity. The antioxidant moiety and the UV-absorbing moiety can, for example, be covalently attached within a single molecule. The UV-absorbing moiety can be attached sufficiently closely to the antioxidant moiety to enhance the stability of the antioxidant in an environment in which photooxidation can occur. In one embodiment, the UV-absorbing moiety is attached to the molecule to be juxtapositioned to the antioxidant moiety.
NTIS
Antioxidants; Patent Applications

20080042368 Greenfield (Wolf) and Sacs, PC, Boston, MA, USA
Biologically Active Surfaces and Methods of Their Use
Berry, D. A., Inventor; Khademhosseini, A., Inventor; Suh, K. Y., Inventor; Sasisekharan, R., Inventor; Langer, R. S., Inventor; 15 Sep 05; 46 pp.; In English
Contract(s)/Grant(s): NIH-EB-00244; NIH-CA-52857
Patent Info.: Filed Filed 15 Sep 05; US-Patent-Appl-SN-11-229 488
Report No.(s): PB2008-104714; No Copyright; Avail.: CASI: A03, Hardcopy

The invention relates to the immobilization of polysaccharides on a substrate. In particular, the invention relates to biologically active surfaces formed by the immobilization of glycosaminoglycans on a substrate. The invention also provides biologically active surfaces that contain one or more different glycosaminoglycans and, optionally, one or more other agents. These agents can be biological or therapeutic agents. The invention also relates to methods of using the surfaces of the invention, such as, methods of affecting biological processes, eliciting patterns of cellular response, screening, treatment, diagnosis and preventing food contamination and/or spoilage.
NTIS
Activity (Biology); Patent Applications; Polysaccharides; Substrates

20080042370 Bozicevic, Field and Francis, LLP, Palo Alto, CA, USA
Polyfluorinated Nucleoside Analogs and Methods of Use Thereof
Kool, E. T., Inventor; 5 Dec 05; 28 pp.; In English
Contract(s)/Grant(s): NIH-EB002059
Patent Info.: Filed Filed 5 Dec 05; US-Patent-Appl-SN-11-295 306
Report No.(s): PB2008-104711; No Copyright; Avail.: CASI: A03, Hardcopy

Nucleoside analogs comprising polyfluorinated benzene, pyrrole, pyridine, indole, isoindole, or benzoimidazole rings are shown to provide for selective base pairing with self, or other polyfluorinated analogs, in preference to native nucleic acid bases. The analogs of the invention stabilize the stacking of helices, and increase hydrophobicity when introduced into an oligonucleotide.
NTIS
Nucleosides; Patent Applications

20080042373 Brinks Hofer Gilson and Lione, Chicago, IL, USA

Synthesis of Ordered Arrays from Gold Clusters

Egusa, S., Inventor; Jin, R., Inventor; Scherer, N. F., Inventor; 23 Jun 05; 23 pp.; In English

Contract(s)/Grant(s): NSF MRSEC (DMR-0213745); NSF MRSEC (CHE-0317009)

Patent Info.: Filed Filed 23 Jun 05; US-Patent-Appl-SN-11-159 778

Report No.(s): PB2008-104702; No Copyright; Avail.: CASI: A03, Hardcopy

A nanocluster includes 1 to 7 metal atoms and has at least one ligand, which is associated with at least one of the metal atoms. A method of making a nanocluster consists of combining a nanoparticle, a ligand and a high boiling point solvent to provide a mixture and heating the mixture at a temperature of at least about 125 degrees C. to form a nanocluster with 1 to 7 metal atoms. An ordered array of nanostructures includes a substrate and a plurality of nanostructures on the substrate, where the nanostructures are made by forming a solution of nanoclusters, depositing the solution on a substrate, and heating the substrate.

NTIS

Gold; Patent Applications; Nanoclusters; Synthesis (Chemistry)

20080042374 Gifford, Krass, Groh, Sprinkle, Anderson and Citkowski, PC, Troy, MI, USA

Iterative, Subtractive Immunoaffinity Method for Proteome Analyte Enrichment

Brown, T. R., Inventor; 12 Jan 06; 12 pp.; In English

Contract(s)/Grant(s): NIH-2R44-ES012277

Patent Info.: Filed Filed 12 Jan 06; US-Patent-Appl-SN-11-331 382

Report No.(s): PB2008-104701; No Copyright; Avail.: CASI: A03, Hardcopy

An immunoaffinity method according an embodiment of the present invention is described for selectably removing highly abundant proteins (HAP) from a sample which contains a mixture of HAP and lower abundance proteins (LAP). One method includes providing a sample having a concentration of original HAP and LAP therein and producing antibodies to the sample. The sample is subjected to a subtractive immunoaffinity chromatography process which employs the antibodies produced. A purified sample is collected which has been subjected to the subtractive immunoaffinity chromatography process. The purified sample is characterized in that the concentration of original HAP has been selectably reduced as compared to the concentration of original LAP. The purified sample now includes a concentration of new HAP and LAP. Also described are antibody compositions, methods for purification of a specimen for analysis, and systems for carrying out the described methods.

NTIS

Enrichment; Proteins; Proteome; Antibodies

20080042420 Greenfield (Wolf) and Sacs, PC, Boston, MA, USA; Massachusetts Inst. of Tech., Cambridge, MA, USA

Methods and Products Related to the Improved Analysis of Carbohydrates (PAT-APPL-11-244 826)

Bosques, C., Inventor; Keiser, N., Inventor; Srinivasan, A., Inventor; Raman, R., Inventor; Sasisekharan, R., Inventor; 6 Oct 05; 116 pp.; In English

Contract(s)/Grant(s): NIH-GM57073

Patent Info.: Filed Filed 6 Oct 05; US-Patent-Appl-SN-11-244 826

Report No.(s): PB2008-104133; No Copyright; Avail.: CASI: A06, Hardcopy

The invention relates, in part, to the improved analysis of carbohydrates. In particular, the invention relates to the analysis of carbohydrates, such as N-glycans and O-glycans found on proteins and saccharides attached to lipids. Improved methods, therefore, for the study of glycosylation patterns on cells, tissue and body fluids are also provided. Information from the analysis of glycans, such as the glycosylation patterns on cells, tissues and in body fluids, can be used in diagnostic and treatment methods as well as for facilitating the study of the effects of glycosylation/altered glycosylation. Such methods are also provided. Methods are further provided to assess production processes, to assess the purity of samples containing glycoconjugates, and to select glycoconjugates with the desired glycosylation.

NTIS

Carbohydrates; Patent Applications

26
METALS AND METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals and metallic materials; and metallurgy.

20080040931 Honeywell Federal Mfg. and Technologies, Kansas City, MO, USA
Milling and Drilling Evaluation of Stainless Steel Powder Metallurgy Alloys
Lazarus, L. J.; Dec. 2001; 52 pp.; In English
Contract(s)/Grant(s): DE-AC04-01AL66850
Report No.(s): PB2008-101034; KCP-613-6489; No Copyright; Avail.: CASI: A04, Hardcopy

Near-net-shape components can be made with powder metallurgy (PM) processes. Only secondary operations such as milling and drilling are required to complete these components. In the past and currently production components are made from powder metallurgy (PM) stainless steel alloys. Process engineers are unfamiliar with the difference in machining properties of wrought versus PM alloys and have had to make parts to develop the machining parameters. Design engineers are not generally aware that some PM alloy variations can be furnished with machining additives that greatly increase tool life. Specimens from a MANTEC PM alloy property study were made available. This study was undertaken to determine the machining properties of a number of stainless steel wrought and PM alloys under the same conditions so that comparisons of their machining properties could be made and relative tool life determined.
NTIS
Drilling; Machining; Metal Powder; Powder Metallurgy; Stainless Steels; Steels

20080041047 Agency for Toxic Substances and Disease Registry, Atlanta, GA, USA
Health Consultation: Assessment of Metals at the C & F Plating Site, Albany, Albany County, New York
Jun. 24, 2004; 9 pp.; In English
Report No.(s): PB2008-104046; No Copyright; Avail.: CASI: A02, Hardcopy

The C & F Plating Site is located at 406 North Pearl Street in the City of Albany, New York. The area was operated as a chrome plating facility from the 1920s to 1985. Since 1985 the facility has been used for storage of miscellaneous equipment. In late January of 2004, the U.S. Environmental Protection Agency (EPA) removed numerous containers of liquid and solid wastes from the site.The Agency for Toxic Substances and Disease Registry (ATSDR) was asked to review data from the post removal sampling activities and to assess the potential for human health hazards associated with exposure to the metal contaminants remaining at the facility. Currently, the questions regarding human health hazards are related to trespassers on the site and the potential hazards for personnel who may conduct subsequent clean-up activities. On April 2, 2004, EPA received validated analytical data of environmental samples taken from the building (chips from the concrete floor and dust/debris) and soil around the building. ATSDR discussed the current conditions at the site in a conference call on June 1, 2004. Participating in the conference call were Jonathan Blonk, ATSDR Regional Representative; Leah Escobar, ATSDR Regional Representative; Carl Pellegrino, EPA On-Scene Coordinator, Region 2; Dan Geraghty, Regional Toxics Coordinator, New York State Department of Health; Keith Gergs, New York State Department of Environmental Conservation (NYSDEC); and numerous scientists from ATSDR who are based in Atlanta, Georgia.
NTIS
Health; Metals; New York; Plating; Toxic Diseases

20080041169 Washington Univ., Seattle, WA USA
Full-Field Strain Behavior of Friction Stir-Welded Titanium Alloy
Greenwell, Trent A; Jan 2008; 236 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483425; CI08-0021; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483425

Titanium is an abundant elemental metal with an exceptional strength-to-weight ratio. Due to properties of high strength, low weight, high heat tolerance, and exceptional corrosion resistance, titanium alloys are used extensively in a number of industries, such as power production, mineral extraction, biomedical, marine, chemical processing, and, of particular interest here, aerospace. The aerospace industry is the single largest user of titanium, particularly Ti-6Al-4V which is considered the workhorse titanium alloy [1]. Unfortunately, the properties that make titanium so attractive for use also make it challenging to machine and join. This difficulty in joining poses particular problems for titanium alloy sheets, which are typically very limited in available sizes. Mechanical joining of titanium sheets requires strict vigilance to assure constant tool integrity and

use of high-strength fasteners, which can be heavy and costly. Titanium is a highly reactive material making conventional fusion welding processes very difficult, though possible with proper preparations and precautions.
DTIC
Friction Stir Welding; Titanium Alloys

20080041235 Air Force Research Lab., Hanscom AFB, MA USA
Advances in SiGeSn Technology
Soref, Richard A; Kouvetakis, John; Tolle, John; Menendez, Jose; D'Costa, Vijay; Dec 2007; 16 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-06-01-0442; Proj-2305
Report No.(s): AD-A483415; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We recently reported the CVD growth of binary Ge(1-y)Sn(y) and ternary Ge(1-y)Si(x)Sn(y) alloys directly on Si wafers using SnD(4), Ge(2)H(6) (di-germane), SiH(3)GeH(3), and (GeH(3))(2)SiH(2) sources. Ge(y)Sn(y) is an intriguing infrared material that undergoes an indirect-to-direct bandgap transition for y < 0.1. In addition, we have found that Ge(1-y)Sn(y) layers have ideal properties as templates for the subsequent deposition of other semiconductors: (a) they are strain-relaxed and have low threading-defect densities (105 cm-2) even for films thinner than 1 micrometer; (b) their low growth temperatures between 250 deg C and 350 deg C are compatible with selective growth, and the films possess the necessary thermal stability for conventional semiconductor processing (up to 750 deg C depending on composition); (c) they exhibit tunable lattice constants between 5.65 A and at least 5.8 A matching InGaAs and related III-V systems; (d) their surfaces are extremely flat; (e) they grow selectively on Si and not on SiO(2); and (f) the film surface can be prepared by simple chemical cleaning for subsequent ex-situ epitaxy.
DTIC
Silicon Alloys; Vapor Deposition

20080041892 Michigan Univ., Ann Arbor, MI USA
MEANS 2: Microstructure- and Micromechanism-Sensitive Property Models for Advanced Turbine Disk and Blade Systems
Pollock, Tresa M; Mills, Michael J; Feb 22, 2008; 12 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-05-1-0100; Proj-UM-F007992
Report No.(s): AD-A484348; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This effort has focused on verification and refinement of the mechanism transitions at intermediate temperatures in the disk alloy Rene 104, with the observation of microtwinning, continuous faulting and dislocation by-pass at successively higher temperatures above 650 degrees C. Evidence for the twin initiation process has also been obtained via TEM studies of specimens interrupted after small strain levels. A model for the novel microtwinning regime. Modeling at the ab initio, atomistic and phase field levels is providing insight into the activation parameters associated with the observed deformation mechanisms. Single crystals of Rene 104 have successfully been grown. A novel phase field model of directional coarsening (rafting) during high temperature, low stress creep of blade alloys has been developed. This model accounts for the local stress fields associated with matrix dislocations as well as the lattice misfit, and demonstrates promising qualitative agreement with experiment. Finally, deformation mechanisms in high temperature creep of several 'generation 4' single crystal blade alloys under rafting conditions have been studied and a model for creep under these conditions developed. The goal of the program is to develop improved models that will (a) incorporate more realistic representation of the relevant microstructures and micromechanisms, (b) enable modeling for a range of relevant service conditions (c) address time-dependent deformation in both disk and blade alloys, and (d) provide this information to the component design process, building upon the paths to the design process created in the DARPA Accelerated Insertion of Materials (AIM) program.
DTIC
Atomic Physics; Bypasses; Heat Resistant Alloys; Micromechanics; Microstructure; Sensitivity; Turbine Blades

20080042073 Kennametal Corp., Latrobe, PA USA
Development of an Advanced Carbide Cutting Tool for Nickel-based Alloy Machining
Santhanam, A T; Aug 28, 2006; 31 pp.; In English
Contract(s)/Grant(s): Proj-NP05-0078-10
Report No.(s): AD-A483254; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483254

The NCDMM placed a sub-contract with Kennametal to develop an advanced carbide tool for high productivity

machining of nickel-base alloys. The contract was awarded in 2005 on a cost share basis with the total labor cost split equally between Kennametal and NCDMM. The program objective was to develop an advanced coated carbide tool for machining nickel-base alloys with 40% higher productivity than the currently existing technology The focus of the project is turning of Inconel 718 alloy.
DTIC
Carbides; Cutters; Machining; Nickel Alloys

20080042149 3M Occupational Health and Environmental Safety, Saint Paul, MN, USA
Platinum Recovery from Nanostructured Fuel Cell Catalyst
Debe, M. K., Inventor; Hamilton, C. V., Inventor; 30 Dec 04; 8 pp.; In English
Contract(s)/Grant(s): DE-FC36-02AL67621
Patent Info.: Filed Filed 30 Dec 04; US-Patent-Appl-SN-11-026 067
Report No.(s): PB2008-104523; No Copyright; Avail.: CASI: A02, Hardcopy

A method and apparatus is provided for recovering platinum metal from a catalyst-coated membrane comprising nanostructured elements by exposure to an oxidizing acidic solution. The method may additionally include, the subsequent step of precipitating a platinum salt from the oxidizing acidic solution. The method may additionally include the subsequent step of calcining the platinum salt.
NTIS
Catalysts; Coatings; Electrocatalysts; Fuel Cells; Membranes; Patent Applications; Platinum

20080042241 National Center for Defense Manufacturing and Machining, Latrobe, PA USA
Improved Buttress Thread Machining for the Excalibur and Extended Range Guided Munitions
Fletcher, Daniel; May 12, 2006; 16 pp.; In English
Contract(s)/Grant(s): Proj-NP05007710
Report No.(s): AD-A483296; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483296

Raytheon requested the NCDMM to evaluate and optimize buttress thread machining. Raytheon's suppliers have had problems producing buttress threads that meet the specified tolerances. These suppliers have tried various types of manufacturing methods but are still unable to consistently produce quality buttress thread components for Raytheon. NCDMM was asked to do the following things: optimize machining of fine pitch Class III Buttress Threads for the Excalibur and ERGM components. Provide training to Raytheon personnel to adapt the newly optimized buttress thread machining technique to all Excalibur and ERGM components. Assist Raytheon in evaluating and optimizing the buttress thread measuring techniques and instruments/gages.
DTIC
Machining; Steels; Threads

20080042245 Dickstein Shapiro Moring and Oshinsky, LLP, Washington, DC, USA; Millennium Cell, Inc., Eatontown, NJ, USA
Apparatus and Process for the Production of Metals in Stacked Electrolytic Cells
Kelly, M. T., Inventor; 10 Nov 05; 11 pp.; In English
Contract(s)/Grant(s): DE-FC36-04G014008
Patent Info.: Filed Filed 10 Nov 05; US-Patent-Appl-SN-11-270 582
Report No.(s): PB2008-104519; No Copyright; Avail.: CASI: A03, Hardcopy

A process and apparatus for reducing an alkali metal salt to an alkali metal through electrolysis in a series of electrolytic cells are disclosed. The process employs as a separator between anode and cathode compartments a material that is both an ionic conductor of the metal ion and an electrical insulator. Preferred metals are sodium, lithium and potassium.
NTIS
Alkali Metals; Electrolysis; Electrolytic Cells; Metals; Patent Applications

20080042248 Colorado School of Mines, Golden, CO, USA

Improved Criteria for Acceptable Yield Point Elongation in Surface Critical Steels. AISI/DOE Technology Roadmap Program. (Final Report, December 8, 2004-May 30, 2007)

Matlock, D.; Speer, J.; May 30, 2007; 155 pp.; In English

Contract(s)/Grant(s): DE-FC36-971D13554

Report No.(s): DE2007-917023; No Copyright; Avail.: Department of Energy Information Bridge

Yield point elongation (YPE) is considered undesirable in surface critical applications where steel is formed since 'strain lines' or Luders bands are created during forming. This project will examine in detail the formation of luders bands in industrially relevant strain states including the influence of substrate properties and coatings on Luders appearance. Mechanical testing and surface profilometry were the primary methods of investigation.

NTIS

Elongation; Metal Sheets; Steels; Yield Point

20080042418 Wall Marjama and Bilinsk, Syracuse, NY, USA

Catalyst Having Metal in Reduced Quantity and Reduced Cluster Size

Flytzani-Stephanopoulos, M., Inventor; Saltburg, H. M., Inventor; Fu, Q., Inventor; 7 Nov 03; 52 pp.; In English

Contract(s)/Grant(s): NSF-CTS-995305

Patent Info.: Filed Filed 7 Nov 03; US-Patent-Appl-SN-10-534 110

Report No.(s): PB2008-104140; No Copyright; Avail.: CASI: A04, Hardcopy

The invention contemplates a method of making a catalytic material, and uses of the material. The catalytic material is made by depositing catalytic metals, such as gold or platinum, on substrate materials, such as lanthanum-doped ceria or other oxides. The catalytic metal, which comprises both crystalline and non-crystalline structures, is treated, for example with aqueous basic NaCN solution, to leach away at least some of the crystalline metallic component. The remaining noncrystalline metallic component associated with the substrate exhibits catalytic activity that is substantially similar to the catalyst as prepared. The use of the catalyst in an apparatus such as a reactor or analytic instrument is contemplated, as is the use of the catalyst in efficient, cost-effective reactions, such as removal of carbon monoxide from fuel gases, for example by performing the water gas shift reaction.

NTIS

Catalysts; Metal Clusters; Patent Applications

27
NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials. For composite materials see *24 Composite Materials*.

20080040814 Ohio State Univ., Columbus, OH, USA

Long-Term Monitoring of Pipe Under Deep Cover

Sargand, S. M.; Masada, T.; Sep. 2007; 240 pp.; In English

Report No.(s): PB2008-101730; No Copyright; Avail.: National Technical Information Service (NTIS)

In the study described in this report, the ORITE research team monitored from 2000 to 2005 the field structural performance of the eighteen thermoplastic pipe structures at the deep burial project site located in Albany, Ohio. In the fall of 2004, the team introduced controlled cuts or notches to the select pipe structures and recorded the pipe wall responses to the defects using strain gages. The team also removed small coupon specimens from the end sections of the select 7-year old thermoplastic pipes and examined them by the standard tensile modulus/strength test method in the laboratory. The long-term field data indicated that the pipe deflections had been fairly stable since the first year, while the soil pressures acting around the pipes had been fluctuating seasonally in each year. According to theoretical analysis, seasonal changes in the air temperature were responsible for the soil pressure fluctuations, not the seasonal changes in the soil moisture conditions. During the in-situ notching experiments, strains induced in the pipe wall by the notching process always disappeared quickly within 10 seconds. There were no signs of slow crack growth observed. This was even true for the longitudinal cuts made at the crown, where tensile stresses usually exist. The laboratory tensile strength test results showed that the tensile properties of the

thermoplastic did not degrade at all over the 7 year period. Overall, the long-term phase of the ORITE thermoplastic pipe deep burial project showed that stress relaxation tends to govern the field behaviors thermoplastic pipe than creep.
NTIS
Pipes (Tubes); Thermoplasticity; Tensile Strength; Tensile Properties; Notches

20080040840 West Virginia Univ., Morgantown, WV, USA; Brigham Young Univ., Provo, UT, USA
Structural Transformation in Ceramics: Perovskite-like Oxides and Group III, IV, and V Nitrides (Final Report, July 1, 2003-December 31, 2006)
Lewis, J. P.; Hatch, D. M.; January 2006; 9 pp.; In English
Contract(s)/Grant(s): DE-FG02-03ER46059
Report No.(s): DE2007-909138; No Copyright; Avail.: National Technical Information Service (NTIS)

Ceramic perovskite-like oxides with the general formula and titanium-based oxides are of great technological interest because of their large piezoelectric and dielectric response characteristics. In doped and nanoengineered forms, titantium dioxide finds increasing application as an organic and hydrolytic photocatalyst. The binary main-group-metal nitride compounds have undergone recent advancements of in-situ heating technology in diamond anvil cells leading to a burst of experimental and theoretical interest. In our DOE proposal, we discussed our unique theoretical approach which applies ab initio electronic calculations in conjunction with systematic group-theoretical analysis of lattice distortions to study two representative phase transitions in ceramic materials: (1) displacive phase transitions in primarily titanium-based perovskite-like oxide ceramics, and (2) reconstructive phase transitions in main-group nitride ceramics. A sub area which we have explored in depth is doped titanium dioxide electrical/optical properties.
NTIS
Ceramics; Nitrides; Oxides; Perovskites

20080040880 Mastermind IP Law, PC, Escondido, CA, USA
Method of Making Composite Particles with Tailored Surface Characteristics
Freim, J. O., Inventor; Bickmore, C. R., Inventor; 12 Jan 05; 14 pp.; In English
Contract(s)/Grant(s): 68-D-03-033; EP-D-04-059
Patent Info.: Filed Filed 12 Jan 05; US-Patent-Appl-SN-11-035 168
Report No.(s): PB2008-103725; No Copyright; Avail.: CASI: A03, Hardcopy

The invention describes a procedure to make metal containing composite particles and composite particle suspensions. The procedure is versatile and can produce particles with a variety of particle sizes and compositions. For some applications the metal composite particles can provide the functionality of wholly metallic particles including configurations where the metal is located on the particle surface. Such metals have application in a wide variety of fields, including accomplishing electrochemical reduction and catalysis.
NTIS
Composite Materials; Metals; Patent Applications

20080040898 Kirsch (Alan D.), Idaho Falls, ID, USA
Coated Armor System and Process for Making the Same
Chu, H. S., Inventor; Lillo, T. M., Inventor; McHugh, K. M., Inventor; 17 Nov 04; 17 pp.; In English
Contract(s)/Grant(s): DE-AC07-99ID13727
Patent Info.: Filed Filed 17 Nov 04; US-Patent-Appl-SN-10-992 521
Report No.(s): PB2008-103868; No Copyright; Avail.: CASI: A03, Hardcopy

An armor system and method involves providing a core material and a stream of atomized coating material that comprises a liquid fraction and a solid fraction. An initial layer is deposited on the core material by positioning the core material in the stream of atomized coating material wherein the solid fraction of the stream of atomized coating material is less than the liquid fraction of the stream of atomized coating material on a weight basis. An outer layer is then deposited on the initial layer by positioning the core material in the stream of atomized coating material wherein the solid fraction of the stream of atomized coating material is greater than the liquid fraction of the stream of atomized coating material on a weight basis.
NTIS
Armor; Coatings; Patent Applications

20080040922 Townsend and Townsend and Crew, LLP, San Francisco, CA, USA; California Univ., Berkeley, CA, USA
Metallic Glasses with Crystalline Dispersions Formed by Electric Currents
Munir, Z. A., Inventor; Holland, T. B., Inventor; Loffler, J. F., Inventor; 17 Jun 03; 11 pp.; In English
Contract(s)/Grant(s): DAAD19-01-1-0493
Patent Info.: Filed Filed 17 Jun 03; US-Patent-Appl-SN-10-464 060
Report No.(s): PB2008-103911; No Copyright; Avail.: CASI: A03, Hardcopy

Metallic glasses of superior mechanical and magnetic properties are manufactured by annealing the glasses under the influence of an electric current to convert the glass to a composite that includes crystallites, preferably nanocrystallites, dispersed through an amorphous matrix.
NTIS
Crystallinity; Electric Current; Metallic Glasses; Patent Applications

20080040927 Humphreys Engineer Center Support Activity, Alexandria, VA, USA
Embedded Barrier to Fluid Flow
McInerney, M. K., Inventor; Morefield, S. W., Inventor; Hock, V. F., Inventor; Malone, P. G., Inventor; Weiss, C. A., Inventor; 7 Mar 06; 14 pp.; In English
Patent Info.: Filed Filed 7 Mar 06; US-Patent-Appl-SN-11-368 473
Report No.(s): PB2008-103722; No Copyright; Avail.: CASI: A03, Hardcopy

A barrier to fluid passage is embedded within, instead of atop, porous material to retain the durability of the surface of the porous material. In one embodiment, a thin set mortar is applied to a concrete slab. A pleated metal foil is pressed into the wet mortar and a bond is established. The mortar is allowed to set and a top, or finish, section of concrete is then poured over the foil and finished conventionally. Provisions are made for sealing expansion joints in concrete slab floors and at the juncture of floor and wall. The foil may be provided in multiple layers to provide a mechanical bond via mortar oozing through perforations or along pleats in each of the top and bottoms layers, while providing a solid layer through which a fluid will not pass, at least in one direction.
NTIS
Embedding; Fluid Flow; Porous Materials

20080041086 Naval Air Warfare Center, China Lake, CA USA
Novel Electroactive Polymers as Environmentally Compliant Coatings for Corrosion Control
Zarras, Peter; Mansfeld, Florian; Wynne, Kenneth, J; Tallman, Dennis E; Benicewicz, Brian C; Xu, Jun; Kendall, Gay; Feb 3, 2006; 189 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-WP1148
Report No.(s): AD-A483194; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483194

The objectives of this SERDP program (WP 1148) have been completed successfully. The synthesis, scale-up and characterization of new monomers based on a bis-amino derivative of poly-p-phenylene vinylene (PPV) called poly(2,5-bis(N-methyl-N-hexylamino)phenylene vinylene, (BAM-PPV) and oligomers of polyaniline have been completed. These polymers have been thoroughly characterized using advanced spectroscopic and analytical methods. The details regarding the EAP synthesis has been published in the literature for duplication including potential industrial use. BAM-PPV pretreatment coating on Al 2024-T3 processed from different solvents passed 336 hours neutral salt fog exposure. This test is required for new pretreatment coatings on aluminum alloys. Additional pretreatments were also studied including trivalent chromium pretreatment (TCP). BAM-PPV coatings in several cases exceeded the 336 hour requirement. BAM-PPV has also been incorporated into full military coating systems that include non-chrome primers and topcoats. These coatings have been tested against known controls such as chromium primers and TCP pretreatment with non-chrome primer and topcoat. BAM-PPV performed as well as the TCP pretreatment with non-chrome primer and topcoat. However, in both cases, each coating did not pass the 2000 hours neutral salt fog exposure test. When BAM-PPV was used with chromium primer and topcoat, this coating system lasted over 4000 hours in a neutral salt fog chamber. Studies by ENM, SVET and XPS showed evidence that BAM-PPV provides more than simply barrier protection to corrosive environments and may passivate the metal surface.
DTIC
Corrosion; Elastic Properties; Electroactive Polymers; Polymers; Protective Coatings

20080041356 Naval Postgraduate School, Monterey, CA USA

Dynamic Simulation of Particles in a Magnetorheological Fluid

Spinks, Joseph M; Jun 2008; 81 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483755; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The mechanical and rheological properties of a MR fluid depend on the induced microstructure of the imbedded ferrous particles. When subject to an external field these particles magnetize and align themselves in chains parallel to the applied magnetic field. The microstructure of these chains is a function of several parameters including particle size, applied magnetic field strength, and viscosity and velocity of the surrounding fluid. This thesis will create a model from a first principle approach to accurately predict the microstructure in a variety of different situations. The model investigated assumes the particles become magnetic dipoles upon the application of the magnetic field and that particle interaction is due solely to dipole-dipole interaction. Due to the inherently small size of the particles, drag is modeled using Stokes drag. This mathematical model will be used to create a computer simulation to visualize and analyze the subsequent transient microstructures formed. The model will assume a constant magnetic field applied (IE no spatial or time gradients) and that the effects of this field are felt instantaneously.

DTIC

Magnetorheological Fluids; Simulation; Transmission Fluids

20080041456 Riley (Nelson Mullins) and Scarborough, LLP, Columbia, SC, USA; South Carolina Univ., Columbia, SC, USA

Biocompatible Cement Containing Reactive Calcium Phosphate Nanoparticles and Methods for Making and Using Cement

Genge, B. R., Inventor; Wu, L., Inventor; Sauer, G. R., Inventor; Wuthier, R. E., Inventor; Genge, R., Inventor; 7 May 04; 18 pp.; In English

Contract(s)/Grant(s): N00014-97-1-0806

Patent Info.: Filed Filed 7 May 04; US-Patent-Appl-SN-10-841 885

Report No.(s): PB2008-103572; No Copyright; Avail.: CASI: A03, Hardcopy

A cement powder is disclosed that contains reactive tricalcium phosphate nanoparticles and other ingredients required to form a cementous material. Methods of making the reactive tricalcium phosphate nanoparticles, the cement powder, the cement paste, and cured cement are also provided, as are methods and articles for using the cement.

NTIS

Calcium Phosphates; Cements; Nanoparticles; Patent Applications; Reactivity

20080041468 Idaho National Lab., Idaho Falls, ID, USA

HIPed Tailored Ceramic Waste Forms for the Immobilization of Cs, Sr., and Tc. Global 2007

Carter, M. L.; Stewart, M. W.; Vance, E. R.; Begg, B. D.; Moricca, S.; Sep. 2007; 8 pp.; In English

Report No.(s): DE2007-918178; INL/CON-07-12875; No Copyright; Avail.: Department of Energy Information Bridge

The Advanced Fuel Cycle Initiative is developing advanced technologies to allow for the safe and economical disposal of waste from nuclear reactors. An important element of this initiative is the separation of key radionuclides. One of the systems being developed to separate key radionuclides is the UREX+1 process. The Tc and Cs/Sr solutions from UREX+1 process will require treatment and solidification for managed storage. This paper illustrates the benefits of HIPed tailored ceramic waste forms, to provide for the immobilization of separated Cs, Sr and Tc. Experimental data are presented for a Cs and Sr-bearing hollandite-rich tailored ceramic prepared with 12 wt% waste (on an oxide basis). Normalized MCC-1 type leach testing at 90oC for 28 days revealed extremely low Cs and Sr release rates of 0.003 and 0.004 g/m2/day respectively. Experimental data on the immobilization of Tc in titanate ceramics containing up to 40wt% TcO2 are also be presented.

NTIS

Ceramics; Hot Isostatic Pressing; Immobilization; Vitrification

20080041520 NASA Glenn Research Center, Cleveland, OH, USA

Reliability Assessment of Graphite Specimens under Multiaxial Stresses

Sookdeo, Steven; Nemeth, Noel N.; Bratton, Robert L.; August 2008; 39 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): SAA3-824; WBS 984754.02.07.03.16.03

Report No.(s): NASA/TM--2008-215204; E-16475; Copyright; Avail.: CASI: A03, Hardcopy

An investigation was conducted to predict the failure strength response of IG-100 nuclear grade graphite exposed to

multiaxial stresses. As part of this effort, a review of failure criteria accounting for the stochastic strength response is provided. The experimental work was performed in the early 1990s at the Oak Ridge National Laboratory (ORNL) on hollow graphite tubes under the action of axial tensile loading and internal pressurization. As part of the investigation, finite-element analysis (FEA) was performed and compared with results of FEA from the original ORNL report. The new analysis generally compared well with the original analysis, although some discrepancies in the location of peak stresses was noted. The Ceramics Analysis and Reliability Evaluation of Structures Life prediction code (CARES/Life) was used with the FEA results to predict the quadrants I (tensile-tensile) and quadrant IV (compression-tension) strength response of the graphite tubes for the principle of independent action (PIA), the Weibull normal stress averaging (NSA), and the Batdorf multiaxial failure theories. The CARES/Life reliability analysis showed that all three failure theories gave similar results in quadrant I but that in quadrant IV, the PIA and Weibull normal stress-averaging theories were not conservative, whereas the Batdorf theory was able to correlate well with experimental results. The conclusion of the study was that the Batdorf theory should generally be used to predict the reliability response of graphite and brittle materials in multiaxial loading situations.
Author
Graphite; Structural Analysis; Reliability Analysis; Brittle Materials; Life (Durability); Compressive Strength; Performance Prediction

20080041530 NASA Glenn Research Center, Cleveland, OH, USA
Air Flow and Pressure Drop Measurements Across Porous Oxides
Fox, Dennis S.; Cuy, Michael D.; Werner, Roger A.; September 2008; 33 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 561581.02.10.03.03
Report No.(s): NASA/TM-2008-215424; E-16596; Copyright; Avail.: CASI: A03, Hardcopy

This report summarizes the results of air flow tests across eight porous, open cell ceramic oxide samples. During ceramic specimen processing, the porosity was formed using the sacrificial template technique, with two different sizes of polystyrene beads used for the template. The samples were initially supplied with thicknesses ranging from 0.14 to 0.20 in. (0.35 to 0.50 cm) and nonuniform backside morphology (some areas dense, some porous). Samples were therefore ground to a thickness of 0.12 to 0.14 in. (0.30 to 0.35 cm) using dry 120 grit SiC paper. Pressure drop versus air flow is reported. Comparisons of samples with thickness variations are made, as are pressure drop estimates. As the density of the ceramic material increases the maximum corrected flow decreases rapidly. Future sample sets should be supplied with samples of similar thickness and having uniform surface morphology. This would allow a more consistent determination of air flow versus processing parameters and the resulting porosity size and distribution.
Author
Porosity; Ceramics; Air Flow; Flow Measurement; Flow Characteristics; Size Distribution; Polystyrene; Morphology

20080041627 Illinois Univ. at Urbana-Champaign, Urbana, IL USA
Reversible Solid Adhesion for Defense Applications
Polycarpou, Andreas A; Jan 31, 2008; 31 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-07-1-0348
Report No.(s): AD-A483809; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483809

In this six month project, we have investigated the adhesion behavior between two solid contacting surfaces with the aim of producing both large bond strength, and under conditions of tangential motion weal bond strength, thus achieving reversible adhesion. For this purpose we have used a newly developed dynamic adhesion tester, nominally flat and spherical surfaces ranging in size from micron to millimeter. Based on the experiments, it was found that the faster the velocity in the horizontal (friction) direction, the lower the bond strength, which could be used for debonding. To achieve a strong bond, larger surface areas with a softer material (e.g., gold coating or polymer-based material) should be used. The bond strength also depends on the surface roughness, applied contact force and the presence of humidity. For example, a polymer-based coated sample gave a 167 X reduction in the bond strength under small tangential motions. These results clearly indicate that the bond strength between solid surfaces can be reversed in a controlled manner. This concept can be further advanced for specific military applications and environments and it has the potential to succeed as solid surfaces are very controllable and can be engineered for many different hostile environments.
DTIC
Adhesion; Bonding; Surface Roughness

20080041688 Army Soldier and Biological Chemical Command, Natick, MA USA

Real-Time Fluorogenic Polymerase Chain Reaction (PCR) Assays to Nucleic Acid-Based Detection of Simulants and Biothreat Agents

Khan, Akbar S; O'Connell, Kevin P; Bucher, Jennifer R; Anderson, Patricia E; Cao, Cheng J; Gostomski, Mark V; Valdes, James J; Jul 1, 2003; 8 pp.; In English

Report No.(s): AD-A483954; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483954

Polymerase chain reaction (PCR) is an exquisitely sensitive method for the amplification and detection of genetic material (DNA and RNA sequences). We have developed several assays using a variation of PCR that proceeds very quickly and allows the monitoring of the progress of the reaction in real time. We describe here assays for the detection of the gene encoding staphylococcal enterotoxin A (SEA), a toxin produced by the bacterium Staphylococcus aureus and an agent responsible for a significant fraction of food poisoning incidents worldwide. We also describe several assays for the detection of a simulant of viral pathogens, the bacteriophage MS2.

DTIC

Assaying; Deoxyribonucleic Acid; Nucleic Acids; Polymerization; Real Time Operation; Staphylococcus; Toxins and Antitoxins

20080041717 Army Natick Soldier Center, Natick, MA USA

Development of Self-Detoxifying Materials for Chemical Protective Clothing

Walker, John; Schreuder-Gibson, Heidi; Yeomans, Walter; Ball, Derek; Hoskin, Francis; Hill, Craig; Jul 1, 2003; 9 pp.; In English; Original contains color illustrations

Report No.(s): AD-A484063; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA484063

The U.S. Army Natick Soldier Center has been developing methods to incorporate reactive compounds into chemical protective fabrics to decontaminate G-type agents, VX, and mustard (HD). These reactive compounds include: polyoxometalates, magnesium oxide and modified cyclodextrins. Polyoxometalates (POMs), prepared at Emory University, have been incorporated into activated carbon for use in carbon based fabrics and have also been combined with metal oxide powders and reacted with half mustard, CEES. Catalytic activity of the POM/Carbon, POM/MgO, POM/Al2O3, and POM alone in solution were compared to activities in organic fibers and films. Substituted cyclodextrins that were reported in 1992 to be scavengers and catalysts for the hydrolytic cleavage of the P-F bond in soman were used in this study.

DTIC

Decontamination; Protective Clothing

20080042131 Christensen, OConnor, Johnson, Kindness, PLLC, Seattle, WA, USA; Washington Univ., Seattle, WA, USA

Porous Structures, and Methods of Use

Zhang, M., Inventor; Li, Z., Inventor; 30 Nov 04; 12 pp.; In English

Contract(s)/Grant(s): NIH-NHLB HL64387-03; NSF-EEC 9529161

Patent Info.: Filed Filed 30 Nov 04; US-Patent-Appl-SN-11-002 996

Report No.(s): PB2008-102449; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention provides porous structures that each comprise chitosan, alginate and divalent metal cations, wherein: (a) the chitosan is ionically linked to the alginate; and (b) the structure is porous and has a compressive yield strength of at least 0.35 MPa. The present invention also provides methods for making the porous structures, and methods for using the porous structures as substrates to grow living cells.

NTIS

Bones; Cell Division; Patent Applications; Porosity

20080042193 Air Force Research Lab., Wright-Patterson AFB, OH USA

Military Aviation Fluids and Lubricants Workshop 2006 (Postprint)

Snyder, Ed; Gschwender, Lois; Campo, Angela; Jun 2006; 865 pp.; In English

Contract(s)/Grant(s): Proj-4347

Report No.(s): AD-A483876; AFRL-RX-WP-TP-2008-4200; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483876

The 2006 Military Aviation Fluids and Lubricants Workshop was comprised of various topics such as current lubricant

research and conditions of lubricants in the field. This year there was an extensive update on hydraulic fluid purification, the background of this topic was discussed in detail along with field testing of purifiers that was ongoing at the time. Progress reports on the SBIR engine oil additive programs were presented. The Navy presented their data on the usage of MIL-PRF-32104 as a corrosion resistant grease. Current research in the coolant and solvent areas was also discussed.
DTIC
Aeronautics; Fluids; Lubricants

20080042280 Lawrence Livermore National Lab., Livermore, CA, USA; California Univ., Berkeley, CA, USA
Durable Silver Mirror with Ultra-Violet Thru Far Infra-Red Relection
Wolfe, J. D., Inventor; 23 Nov 05; 19 pp.; In English
Contract(s)/Grant(s): W-7405-ENG-48
Patent Info.: Filed Filed 23 Nov 05; US-Patent-Appl-SN-11-286 368
Report No.(s): PB2008-103952; No Copyright; Avail.: CASI: A03, Hardcopy

A durable highly reflective silver mirror characterized by high reflectance in a broad spectral range of about 300 nm in the UV to the far infrared (approx. 10000 nm), as well as exceptional environmental durability. A high absorptivity metal underlayer is used which prevents the formation of a galvanic cell with a silver layer while increasing the reflectance of the silver layer. Environmentally durable overcoat layers are provided to enhance mechanical and chemical durability and protect the silver layer from corrosion and tarnishing, for use in a wide variety of surroundings or climates, including harsh or extreme environments.
NTIS
Durability; Mirrors; Patent Applications; Silver

28
PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; their storage and handling procedures; and aircraft fuels. For nuclear fuels see *73 Nuclear Physics*. For related information see also *07 Aircraft Propulsion and Power; 20 Spacecraft Propulsion and Power*; and *44 Energy Production and Conversion*.

20080041673 Naval Facilities Engineering Service Center, Port Hueneme, CA USA
Effect of Biodiesel on Diesel Engine Nitrogen Oxide and Other Regulated Emissions
Holden, Bruce; Jack, Jason; Miller, Wayne; Durbin, Tom; May 2006; 110 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-WP-0308
Report No.(s): AD-A483907; NFESC-TR-2275-ENV; No Copyright; Avail.: Defense Technical Information Center (DTIC) ONLINE: http://hdl.handle.net/100.2/ADA483907

This report summarizes the results of a 3-year project lead by the Naval Facilities Engineering Service Center (NFESC) to obtain emissions factors (i.e. tailpipe air pollution emissions data) from 10 types of Department of Defense (DoD) operated diesel powered engines. Emissions data was obtained from 8 vehicles, primarily buses and trucks, and 2 portable generators. All testing was performed with the engines installed in the vehicles/portable equipment. Emissions factors were determined for the engines fueled with various blends/types of biodiesel as well as a baseline fuel, either California Air Resources Board (CARB) certified Ultra Low Sulfur Diesel (USLD) (15-ppm sulfur maximum) or JP-8. CARB USLD was used since it will be required within California for on-road vehicles starting in June 2006. Biodiesel blends from 20% to 70% were tested along with 100% biodiesel. For the blended biodiesel testing, the biodiesel was mixed with USLD. Although several blends were tested, the project focused on B20 (20% biodiesel) blends, since this is the primary blend of biodiesel used in military vehicles. Testing performed on B20 fuels identified three significant results: (1) There were no consistent trends over all engines tested, (2) There were no statistically significant emissions differences found between biodiesel fuels manufactured from yellow grease or soy bean oil feedstocks, and (3) An extensive statistical analyses indicated no statistically significant differences in Hydrocarbon (HC), Carbon Monoxide (CO), Nitrogen Oxides (NOx) or Particulate Matter (PM) emissions between a B20 biodiesel manufactured at Naval Base Ventura County from yellow grease and CARB ULSD petroleum diesel. The results from this project are significantly different than those previously reported by the Environmental Protection Agency (EPA). Of particular interest is the fact that for actual DoD fleet diesel engines, there was no statistically significant increase in NOx emissions.
DTIC
Diesel Engines; Diesel Fuels; Nitrogen Oxides

31
ENGINEERING (GENERAL)

Includes general research topics related to engineering and applied physics, and particular areas of vacuum technology, industrial engineering, cryogenics, and fire prevention. For specific topics in engineering see *categories 32 through 39*.

20080041144 Johns Hopkins Univ., Laurel, MD USA
A Systems-Level Analysis of the JHU/APL Time and Frequency Laboratory
Miranian, Mihran; Weaver, Gregory L; Dragonette, Richard; Reinhart, Matthew J; Nov 2007; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483323; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483323

In past years, we have reported on continuous improvement in the operation of the master clock of our Time and Frequency Laboratory at the Johns Hopkins University Applied Physics Laboratory. We have discussed our ensemble of hydrogen maser and cesium beam atomic frequency standards into an autonomous timescale that maintains UTC (JHU/APL) within + or - 20 ns per month of UTC. This year, since completing the major aspects of our laboratory refurbishment, we have undertaken systems analysis toward optimization and improved timekeeping. In our paper, we will describe the system of clocks, control mechanisms, and their relationship that maintain our laboratory's accuracy. One outcome will describe the determination of our worst performing clock through frequency characterization and the performance improvement in the UTC (JHU/APL) timescale through selectively weighting its contribution.
DTIC
Atomic Clocks; Frequencies; Masers; Systems Analysis; Universal Time

20080041159 Bureau International des Poids et Mesures, Sevres, France
Combination of GPS PPP and Two-Way Time Transfer for TAI Computation
Jiang, Z; Petit, G; Nov 2007; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483375; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483375

To follow the CCTF 2006 recommendation of using high-precision GPS carrier-phase data (CP) for TAI generation, BIPM computes monthly the GPS PPP (Precise Point Positioning) time links and publishes the result on the TAI ftp site. The GPS PPP is a combined solution of the codes and CP information. The latter assigns the high precision to the PPP result. It is shown that the PPP links have a better time stability than the TW ones in short and middle terms (up to a week). On the other hand, TW could be more stable on the long term, due to its symmetric measurement procedure and its more accurate absolute calibration. The combination of PPP and TW may benefit the advantages of both links. Because the GPS and TW are completely independent techniques, combination of them makes the results less noisy, less biased, and more robust. The combination gives also a possibility to analyze the errors presented in each technique. One of them is the diurnal deviation in some TW KU band links. In this paper, we first briefly review the recent study on the uncertainties of PPP and TW, then quickly recall the model used for the combination, and finally evaluate of the method proposed using measuring data. The TAI time network is highly redundant. This approach gives a new idea about fully using the potential of the two fundamental time transfer techniques: GPS and TW.
DTIC
Clocks; Computation; Global Positioning System; Numerical Analysis; Positioning

20080041278 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA
Performance Characterization Methods of Aerosol Samplers
Kesavan, Jana S; Doherty, Robert W; Bottiger, Jerold R; Jul 1, 2003; 8 pp.; In English
Report No.(s): AD-A483533; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Samplers are characterized at ECBC using the following methods: (1) monodisperse fluorescent/nonfluorescent PSL microspheres with fluorometric analysis or Counter analysis, (2) polydisperse solid aluminum oxide particles with APS analysis or Coulter Multisizer analysis, (3) fluorescent oleic acid particles with fluorometric analysis, and (4) bioparticles with Coulter Multisizer, culturing, ELISA, PCR, and APS analyses. PSL microspheres are generated using the Collison nebulizer, sonic nozzle, Ink Jet Aerosol Generator (IJAG), and puffers. Aluminum oxide particles are generated using the sonic nozzle,

fluorescent oleic acid particles are generated using the Vibrating Orifice Aerosol Generator, and bioparticles are generated using the puffers, IJAG, and sonic nozzle.
DTIC
Aerosols; Air; Samplers

20080041283 California Univ., Berkeley, CA USA
A Locally Nonlinear Interpretation of PUV Measurements
Sobey, Rodney J; Hughes, Steven A; Oct 1998; 21 pp.; In English
Report No.(s): AD-A483548; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A time domain method is presented for analyzing simultaneous measurements of pressure and the horizontal components of velocity obtained beneath irregular multidirectional wave fields. This new method differs from the usual linear directional analyses applied to PUV data in two important aspects. First, the essential nonlinearity of the measured waves is not sacrificed to achieve a solution. Therefore, predictions of sea surface elevation and directional kinematics throughout the water column accurately portray the actual nonlinear character of the waves. Second, the analysis method is 'local' in that it can be applied to segments of PUV time series much shorter than an individual wave. The viability of the locally nonlinear methodology developed in this paper is proven by demonstrating agreement with higher-order theoretical steady waves. Predictions of sea surface elevation and wave kinematics are also made using actual measurements from PUV instruments at two ocean sites off the west coast of the USA.
DTIC
Nonlinearity; Ocean Surface; Pressure Measurement; Water Waves

20080041328 Eagle Alliance, Annapolis, MD USA
Distribution of Time Services Over Networks in a Multi-Network Environment
Shaton, George A; Dec 2002; 17 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483652; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This paper explores reasons for clock synchronization, risks if not performed, and proposes a design for providing clock synchronization in a typical network. In an inter-network environment, it is important to synchronize the clocks in each network device and terminal to a consistent time scale. Moreover, the larger the network, the more important clock synchronization becomes. When dealing with several independent networks, which must exchange data, synchronization is mandatory for efficient transfer of data. The design will present the physical implementation (what hardware is needed), the logical design (selection and use of certain protocols), performance requirements (accuracy, resolution, and measurement), management of the resulting design, security issues, and Domain Name Service (DNS) considerations.
DTIC
Clocks; Networks

20080041339 Naval Observatory, Washington, DC USA
Design and Preliminary Characterization of the USNO Rubidium Fountain
Peil, Steven; Crane, Scott; Swanson, Thomas B; Ekstrom, Christopher R; Aug 2005; 5 pp.; In English
Report No.(s): AD-A483676; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We have built and begun characterization of an engineering prototype rubidium atomic fountain at the USNO for use in its clock ensemble. We achieve short-term stability of 1.4 10(exp -13)/tau(exp 1/2), which meets the desired performance for characterizing maser drift. We will discuss the design, operation, and preliminary characterization of this device.
DTIC
Atomic Clocks; Atoms; Masers; Rubidium

20080041652 Naval Research Lab., Bay Saint Louis, MS USA
Optimizing Performance of a Microwave Salinity Mapper: STARRS L-Band Radiometer Enhancements
Burrage, Derek M; Wesson, Joel C; Goodberlet, Mark A; Miller, Jerry L; May 4, 2007; 19 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483857; NRL/JA/7330-05-5315; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483857

Airborne microwave radiometers for salinity remote sensing have advanced to a point where operational surveys can be conducted over the inner continental shelf to observe the evolution of freshwater plumes emanating from rivers and estuaries.

To determine seawater microwave emissivity, and hence conductivity and salinity, precisely and accurately demands high instrument sensitivity, stability, and sampling rates; such requirements involve significant design trade-offs. The Salinity, Temperature and Roughness Remote Scanner (STARRS) was developed to enhance these features relative to existing instruments. The authors describe here key elements of the STARRS design and the results of early performance assessments and deployments. During early deployments, the instrument performed well in areas of moderate to high salinity signal-to-noise ratio, but more homogenous areas revealed band-limited random signal fluctuations on the order of a 6-min period and ~1-K amplitude that were of internal origin. Detailed analyses of laboratory and field tests revealed that internal 'flicker,' or 1/f noise (having spectral roll-off proportional to the reciprocal of frequency f), was the main source of these fluctuations. The instrument was modified to eliminate the random fluctuations and to further enhance sensitivity and stability. Laboratory tests and recent field deployments show that the upgrade improved instrument performance dramatically to the extent that continental shelf scale areas with relatively homogenous salinity distributions can now be surveyed reliably using STARRS. Airborne microwave radiometers for salinity remote sensing have advanced to a point where operational surveys can be conducted over the inner continental shelf to observe the evolution of freshwater plumes emanating from rivers and estuaries.
DTIC
Augmentation; Microwaves; Radiometers; Salinity; Ultrahigh Frequencies

20080041661 Physikalisch-Technische Bundesanstalt, Brunswick, Germany
Time and Frequency Activities at the Physikalisch-Technische Bundesanstalt
Piester, D; Bauch, A; Becker, J; Polewka, T; Dec 2004; 13 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483874; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483874

PTB is entrusted to provide legal time for Germany and is serving as the European node for time comparisons among institutes collaborating with the BIPM in the realization of TAI. Recent activities pursued in this context were directed towards an improved knowledge of internal delays of PTB's time comparison equipment. The standard frequency and time signal transmission via DCF77 remains the most important means to disseminate legal time, and we report on some new ideas for additional use of the broadcast signal. As the foundation of our work, we continued the operation of the primary clocks CS1 and CS2, and of the cold-atom cesium fountain CSF1.
DTIC
Atomic Clocks; Frequencies; Frequency Standards; Research Facilities; Time Measurement

20080041666 Harvard-Smithsonian Center for Astrophysics, Cambridge, MA USA
A Novel Absorption Resonance for Atomic Clocks
Phillips, David F; Novikova, Irina; Zibrov, Sergei; Smallwood, Chris; Taichenachev, Aleksei V; Yudin, Valeriy I; Walsworth, Ronald L; Zibrov, Alexander S; Aug 2005; 8 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483883; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483883

We report an experimental study of an all-optical three-photon-absorption resonance (known as an 'N-resonance') and discuss its potential application as an alternative to atomic clocks based on coherent population trapping (CPT). We present measurements of the N-resonance contrast, width and light shift for Rb87 under various conditions including both D1 and D2 optical transitions. Under conditions such that first-order light shifts cancel, we observe promising short-term frequency stability (approx. 1.5 10(exp -11) tau(exp -1/2)) for an N-resonance on the D1 transition of Rb87 vapor.
DTIC
Atomic Clocks; Clocks; Energy Absorption; Photons; Resonance; Rubidium

20080041808 Air Force Research Lab., Mesa, AZ USA
Evaluating the Effectiveness of Flight Simulators for Training Combat Skills: A Review
Bell, Herbert H; Waag, Wayne L; Jan 1998; 21 pp.; In English
Contract(s)/Grant(s): Proj-1123
Report No.(s): AD-A484153; AFRL-HE-AZ-JA-1998-0001; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The military is focusing a great deal of effort on developing virtual world technologies that will allow training combat skills in flight simulators. Considerably less attention is being directed toward documenting the effectiveness of such training.

In this article, we review Air Force and Navy efforts to evaluate the effectiveness of training the combat skills necessary for attack and fighter aircraft in flight simulators. The majority of these efforts indicate that simulation can be a valuable complement to the aircraft. Unfortunately, this conclusion is based primarily on opinion data from experienced aviators. There are very few transfer of training experiments, and those experiments have examined only a limited set of combat tasks. We also describe the typical paradigms used to conduct training evaluations and outline a multistep evaluation program for determining training effectiveness.
DTIC
Combat; Education; Flight Simulators; Transfer of Training

20080041822 National Measurement Inst., Lindfield, Australia
GPS Activities at the National Measurement Institute, Australia
Warrington, R B; Fisk, P T; Lawn, M A; Wouters, M J; Gajaweera, A; Quigg, S; Thorn, J S; Jan 2005; 6 pp.; In English
Report No.(s): AD-A484179; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The National Measurement Institute, Australia, (NMIA) is continuing the development of reliable, high-integrity and remotely-operable GPS-based systems for precise time and frequency transfer. These systems combine an OEM receiver with a PC and support a variety of applications, of which we describe three: the intercomparison of receiver internal delays among laboratories in the Asia-Pacific, using a portable time-transfer system; a geodetic monitoring station, contributing data to Australian and international geodetic reference networks; and delivery of traceable time and frequency to a distant location, or equivalently continuous remote calibration of a frequency standard at a client's premises.
DTIC
Australia; Frequencies; Frequency Standards; Global Positioning System; Time Measurement

20080041899 Symmetricom, Inc., Beverly, MA USA
The Chip-Scale Atomic Clock - Coherent Population Trapping vs. Conventional Interrogation
Lutwak, R; Emmons, D; Riley, W; Garvey, R M; Jan 2003; 13 pp.; In English
Contract(s)/Grant(s): NBCHC020050
Report No.(s): AD-A484363; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Symmetricom-TRC has undertaken a development effort to produce a prototype chip-scale atomic clock 'CSAC'. The overall architecture of the CSAC and, in particular, the physics package, must be defined early in the project, prior to the onset of a large-scale engineering effort. Within the constraints imposed by the performance goals of the project, we have recognized two possible schemes for interrogating the ground-state hyperfine frequency of the gaseous atomic ensemble: the conventional double-resonance technique and the coherent population trapping technique. In this paper, we describe a laboratory apparatus, which allows for in situ comparison of the two techniques, without the ambiguities associated with comparing data from disparate experiments. Data are presented comparing the short-term stability resultant of the two techniques, as well as environmental sensitivity to resonance cell temperature, laser intensity, and RF power.
DTIC
Atomic Clocks; Chips; Interrogation; Populations; Trapping

20080041900 Lne-Syrte, Paris, FL France
Minimizing the Required Trap Depth in Optical Lattice Clocks
Lemonde, Pierre; Wolf, Peter; Aug 2005; 10 pp.; In English
Report No.(s): AD-A484364; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We study the trap depth requirement for the realization of an optical clock using atoms confirmed in a lattice. We show that site-to-site tunnelling leads to a residual sensitivity to the atom dynamics hence requiring large depths (50 to 100Er for Sr) to avoid any frequency shift or line broadening of the atomic transition at the 10(-17) - 10(-18) level. Such large depths and the corresponding laser power may, however, lead to difficulties (e.g. higher order light shifts, two-photon ionization, technical difficulties) and therefore one would like to operate the clock in much shallower traps. To circumvent this problem we propose the use of an accelerated lattice. Acceleration lifts the degeneracy between adjacents potential wells which strongly inhibits tunnelling. We show that using the Earth's gravity, much shallower traps (down to 5 Er for Sr) can be used for the same accuracy goal.
DTIC
Atomic Clocks; Clocks; Depth; Optical Properties

20080041902 Naval Research Lab., Washington, DC USA

NRL Analysis of GPS On-Orbit Clocks

Oaks, J; Senior, K; Largay, M; Beard, R; Buisson, James; Jan 2005; 8 pp.; In English; Original contains color illustrations

Report No.(s): AD-A484376; XB-NRL/MR/8150; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The U.S. Naval Research Laboratory 'NRL' has collected data and analyzed GPS space vehicle atomic clock performance since the beginning of the GPS Program. These analyses have largely been based on pseudorange observations and precise post-fit ephemerides provided by the National Geospatial-Intelligence Agency 'NGA'. Observational data and clock comparisons were limited to data collected within the GPS system due primarily to the lack of global tracking resources and effective means of gathering the data. With the successful conclusion of the International GPS Service 'IGS' and Bureau International Poids and et Mesures 'BIPM' Pilot Project, new capabilities to associate IGS geophysical data to Universal Coordinated Time 'UTC', and integration of timing centers to contribute to the determination of UTC are evolving. Data collection from participating timing centers and analysis to form the IGS timescales and Clock Products has established new capabilities for analysis of orbiting precision atomic clocks. NRL leads the IGS Clock Products Working Group and generates the IGS timescales. These efforts joined together with the GPS on-orbit analyses offer new possibilities for analysis and improved performance for both GPS and IGS. This paper will discuss these new resources for analysis and possible improved analytical capabilities.

DTIC

Atomic Clocks; Clocks; Global Positioning System

20080041910 Bureau International des Poids et Mesures, Sevres, France

BIPM Comparison of Time Transfer Techniques

Arias, F; Jiang, Z; Lewandowski, W; Petit, G; Aug 2005; 5 pp.; In English; Original contains color illustrations

Report No.(s): AD-A484416; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Clock comparison for International Atomic Time 'TAI' is based on common views of satellites of the GPS constellation and on the technique of two-way satellite time and frequency transfer 'TWSTFT'. All the TWSTFT links are backed up by the GPS ones. Due to the duplicity of techniques in many baselines, the international network of time links is today highly redundant. The improvement of GPS satellite ephemerides and clock values produced by the International GNSS Service 'IGS' might lead to the utilization of the all-inview 'AV' method for the computation of GPS links instead of the common-view 'CV' one currently used for TAI. Studies started at the BIPM to validate the GPS AV method for introduction in the calculation of TAI. To assist related studies, we developed a procedure to compare the links measured with different techniques and calculated with different methods. Results of these comparisons obtained since January 2005 are published on the BIPM ftp site, with monthly updates after the calculation of BIPM Circular T.

DTIC

Atomic Clocks; Global Positioning System

20080041914 Academia Sinica, Shaanxi, China

Determining Geo-stationary Satellite Position Using TWSTFT Links

Hongwei, Sun; Zhigang, Li; Huajnxin, Li; Yuli, Li; Aug 2005; 6 pp.; In English

Report No.(s): AD-A484426; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Based on several two-way satellite time and frequency transfer (TWSTFT) links and multi-channel time transfer modems, a positioning method to geo-stationary communication satellite is presented, moreover, the accuracy of the positioning is concisely estimated. The characteristics of the method are simple and practical. Especially, the positioning system is completely established on TWSTFT links, so it does not need an extra investment.

DTIC

Communication Satellites; Position Sensing

20080042119 National Inst. of Standards and Technology, Boulder, CO USA

A Comparison of GPS Common-View Time Transfer to All-in-View

Weiss, M A; Petit, G; Jiang, Z; Aug 2005; 6 pp.; In English; Original contains color illustrations

Report No.(s): AD-A484155; No Copyright; Avail.: Defense Technical Information Center (DTIC)

All-in-view time transfer is being considered to replace common-view for computing the links of International Atomic Time 'TAI'. The components in all-in-view GPS time transfer that do not cancel as they do in the common-view technique are the satellite clock estimate and the ephemeris estimate. We show that these components average down as white phase noise

with a typical level of 2 ns with 13 minute averaging,and under 100 ps at 1 d. Looking at closures including stations in Europe, North America and Japan, we see evidence for a white PM level below 0.5 ns with an averaging time of 1 d, a flicker floor of 100 ps after 3 d, and systematic effects at a level of up to 1 ns. We also show evidence that errors in ionospheric maps and multi-path interference can cause noise processes at least as dispersive as flicker phase noise at 300 ps from 1 d to past 10 d. We conclude that all-in-view GPS time transfer improves stability over common-view for links as long as 5000 km, and is equivalent for links as short as 2500 km. We also find that ionosphere-free time transfer data may provide a significant improvement for averaging past 1 d.
DTIC
Atomic Clocks; Global Positioning System

20080042126 National Inst. of Standards and Technology, Boulder, CO USA
Characterizing the Performance of GPS Disciplined Oscillators with Respect to UTC(NIST)
Lombardi, Michael A; Novick, Andrew N; Zhang, Victor S; Aug 2005; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484160; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Global Positioning System Disciplined Oscillators 'GPSDOs' are now the primary standard of time and frequency at many laboratories and calibration facilities. They are typically accepted as self-calibrating standards, and their users generally assume that they meet the manufacturer's specifications. To gain a better understanding of the actual performance of GPSDOs, this paper presents a method of characterizing both their long and short-term performance that uses the UTC'NIST' time scale as a reference. It then describes how this method is used to characterize four GPSDOs, including two that use an oven controlled quartz oscillator 'OCXO' as their time base, and two equipped with a rubidium oscillator. All four devices were simultaneously tested using the same antenna over two 60 d measurement intervals. During the first 60 d measurement, a previously surveyed antenna position was used and the same coordinates were applied to all four devices. During the second 60 d measurement, each GPSDO performed an independent survey of the antenna's position and applied its own coordinates. Both the timing output '1 pulse per second' and the frequency output '10 MHz' of each GPSDO was measured during both 60 d intervals. A low-noise dual mixer time difference system was used to characterize the short-term frequency stability of each device's 10 MHz output, and all measurement results are presented and summarized.
DTIC
Calibrating; Global Positioning System; Oscillators

20080042194 National Inst. of Standards and Technology, Boulder, CO USA
On the Power Dependence of Extraneous Microwave Fields in Atomic Frequency Standards
Jefferts, S R; Shirley, J H; Ashby, N; Heavner, T P; Donley, E A; Levi, F; Jan 2005; 7 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483885; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483885

We show that the frequency bias caused by distributed cavity phase has a strong dependence on microwave power. We also show that frequency biases associated with microwave leakage have distinct signatures in their dependence on microwave power and the physical location of the leakage interaction with the atom.
DTIC
Atomic Clocks; Bias; Cavities; Frequencies; Frequency Standards; Leakage; Microwave Frequencies; Microwaves

20080042225 Armstrong Lab., Mesa, AZ USA
Evaluation of Two Wide-Field-of-View Display Systems for Air-Combat Training
Crane, Peter; Nov 2, 1994; 4 pp.; In English
Contract(s)/Grant(s): Proj-1123
Report No.(s): AD-A484332; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A simulator system for training air-combat skills was evaluated by having teams of experienced pilots fly simulated missions. The simulators used were equipped with two different types of wide-field-of-view visual display systems. Pilot evaluations demonstrated that wide-field-of-view displays are necessary for multiship simulator training, even for tasks considered to be non-visual.
DTIC
Combat; Display Devices; Education; Field of View; Flight Training; Simulators; Warfare

32
COMMUNICATIONS AND RADAR

Includes radar; radio, wire, and optical communications; land and global communications; communications theory. For related information see also 04 Aircraft Communications and Navigation; and *17 Space Communications, Spacecraft Communications, Command and Tracking*; for search and rescue, see *03 Air Transportation and Safety*; and *16 Space Transportation and Safety*.

20080040958 Chulalongkorn Univ., Bangkok, Thailand

Performance Evaluation of Optimal Interconnection-based Routing Algorithms in Multi-operator Telecommunication Network

Wannasiri, Chatkwan; Aswakul, Chaodit; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 6 pp.; In English; See also 20080040944; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This paper is concerned with the analysis of optimal routing problem in the heterogeneous environment of telecommunication networks, where more than one operator is responsible for all the network controls. The objective is to evaluate candidate routing algorithms which allow a given network to optimize specified objective functions. Based on the framework of interconnection, four routing algorithms are proposed, namely, (i) shortest path routing with no interconnection charge, (ii) cost-based shortest path routing with interconnection charge, (iii) resource-based shortest path routing with interconnection charge and (iv) dynamic alternative routing with interconnection charge. Discrete-event simulation of practical network scenarios are given to show how these routing algorithms perform comparatively in terms of both engineering grade-ofservice indicators and business measures (i.e. call blocking, network utilization as well as mean values of servicing cost, network revenue and obtainable profit). The obtained results suggest that the dynamic alternative routing with interconnection charge is the most preferable routing algorithm when the network has light loads. Alternatively, under heavy loads, it is found that the resource-based shortest path routing with interconnection charge is the best.

Author

Algorithms; Network Control; Telecommunication

20080041030 National Inst. of Justice, Washington, DC USA

Investigative Uses of Technology: Devices, Tools, and Techniques

Oct. 2007; 169 pp.; In English

Report No.(s): PB2008-103287; NCJ-213030; No Copyright; Avail.: CASI: A08, Hardcopy

This special report is intended to be a resource to any law enforcement personnel (investigators, first responders, detectives, prosecutors, etc.) who may have limited or no experience with technology-related crimes or with the tools and techniques available to investigate those crimes. It is not all inclusive. Rather, it deals with the most common techniques, devices, and tools encountered. Technology is advancing at such a rapid rate that the information in this special report must be examined in the context of current technology and practices adjusted as appropriate. It is recognized that all investigations are unique and the judgment of investigators should be given deference in the implementation of this special report. Circumstances of individual cases and Federal, State, and local laws/rules may require actions other than those described in this special report.

NTIS

Crime; Internets; Law (Jurisprudence)

20080041093 Clemson Univ., SC USA

Integrated Cross-Layer Protocols for Adaptive Transmission and Routing of Multimedia Traffic in Tactical Spread-Spectrum Networks

Pursley, Michael B; Russell, Harlan B; Wysocarski, Jeffrey S; Jun 2004; 36 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483205; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483205

No abstract available

Adaptation; Multimedia; Protocol (Computers); Spread Spectrum Transmission; Traffic

20080041095 Stanford Univ., Stanford, CA USA
Cross-layer Design of Wireless Networks with Resource-Constrained Nodes
Goldsmith, Andrea; Jun 2, 2004; 26 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483208; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483208
No abstract available
Communication Networks; Energy Consumption

20080041100 Army Command and General Staff Coll., Fort Leavenworth, KS USA
Integrating Joint Intratheater Airlift Command and Control with the Needs of the Modular Army: A Perspective of Current and Past Nonlinear Operations
Percival, William D; Jun 13, 2008; 131 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483230; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483230
The command and control of today's intratheater airlift system, as seen in doctrine and in application, is complicated and conflicted. As the Army continues its transformation to the modular force, requirements for responsive and flexible intratheater airlift have grown. In contrast, existing Joint and Air Force intratheater airlift doctrine does not address these needs, as seen in recent operations during Operation Iraqi Freedom. Presented in this thesis are two historical case studies of past intratheater airlift efforts: Burma during World War II and the tactical airlift system of Vietnam. Both provide examples of distinct intratheater airlift command and control arrangements with similar attributes called for by Army transformation. Both case studies provide lessons in the application of theater airlift to support ground forces in a nonlinear battlefield. Coupled with identified failings in both doctrine and structure of the current theater distribution system, this thesis identifies requirements of theater airlift if it is to provide effective and efficient support to the modular force. With an understanding of current and past doctrine, structural evolutions of intratheater airlift, and the effects of each system, this thesis concludes with recommended changes to the intratheater airlift command and control structure to meet Army requirements.
DTIC
Command and Control; Nonlinearity

20080041119 Clemson Univ., SC USA
Medium-Access Control Protocols for Heterogeneous Mobile Ad Hoc Networks with Directional Antennas
Noneaker, Dan; Russell, Harlan; Jun 2, 2004; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-00-1-0565; DAAD19-00-1-0156
Report No.(s): AD-A483266; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483266
No abstract available
Access Control; Communication Networks; Directional Antennas; Heterogeneity; Protocol (Computers)

20080041161 Naval Research Lab., Washington, DC USA
Clock Management Data Analysis for Satellite Communications
Gross, Rachel; Melkers, Raimond; Aug 2005; 8 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483394; XB-NRL/MR/8150; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483394
The U.S. Naval Research Laboratory has installed GPS-based timing systems in several Defense Satellite Communication System 'DSCS-III' satellite communication facilities to support the Single Channel Transponder 'SCT' program. The goal of these systems was to manage the satellite crystal oscillators to 25 microsecond accuracy and ground cesium clocks to 5 microsecond accuracy. A Windows-compatible computer program was written to facilitate the clock management of these oscillators. This paper will describe these systems, as well as give detailed data analysis of the time management for the satellite oscillators.
DTIC
Clocks; Management Analysis; Satellite Communication

20080041166 Military Univ. of Technology, Warsaw, Poland
Polish Tactical Data Exchange System
Udrycki, Jacek; Michalak, Jaroslaw; Dec 2007; 13 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483406; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483406
No abstract available
Data Links; Data Systems; Telecommunication; Wide Area Networks

20080041167 Research Inst. for Communication, Information Processing and Ergonomics, Wachtberg-Werthhoven, Germany
Replication in Mobile Environments
Fassbender, Heinz; Dec 2007; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483408; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483408
No abstract available
Communication Networks; Data Bases

20080041175 Danish Army Command and Control Information System, Haderslev, Denmark
An Operational View of the Problems in Data Exchange in the Army Mobile Environment
Rasmussen, Erling J; Dec 2007; 38 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483444; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483444
No abstract available
Command and Control; Operational Problems

20080041301 Naval Postgraduate School, Monterey, CA USA
Combat Service Support Soldier Network Enabled Operations (CSNEO)
Baez, Francisco R; Jun 2008; 123 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483595; No Copyright; Avail.: Defense Technical Information Center (DTIC)
Modeling and simulation provides a cost effective means to gain insights into the potential benefits of network-enabled capabilities in a variety of operational settings. This research outlines a methodology and provides a use case for employing modeling and simulation in the identification of significant factors for network-enabled capabilities. The effort explores the use of the U.S. Army Training and Doctrine Command (TRADOC) Analysis Center's Logistics Battle Command (LBC) model to examine the distribution of capabilities across an organizational structure. It leverages large, space-filling designs of experiments, in conjunction with high performance computing clusters, to assess the impact of Soldier-level, network-enabled capabilities on transportation terminal node operations within a sustainment base supporting a Joint Force. Further, this research coalesces experimental design and exploratory data analysis to examine 771 variants of the operational scenario. Three network structures are examined, namely, the Hierarchical, Star, and Hierarchical- Star topologies, to quantify the impacts of network-enabled capability on the velocity, reliability, and visibility measures of effectiveness. The results suggest that increasing network-enabled capabilities yields a significant return of investment over the current capabilities. The latter network topologies show that Soldiers performing terminal node cargo operations are better connected, and this leads to more responsive distribution systems.
DTIC
Combat; Logistics; Support Systems

20080041317 Naval Postgraduate School, Monterey, CA USA
A Simulation on Organizational Communication Patterns During a Terrorist Attack
Bas, Ali; Karaca, Volkan; Jun 2008; 79 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483636; No Copyright; Avail.: Defense Technical Information Center (DTIC)
The purpose of this project is to provide a simulation which includes communication structures during a terrorist attack. Different communication patterns will provide different results in terms of effectiveness and efficiency. We are planning to identify some key variables to form an effective network structure in a military action. According to key variables of an organization, centralized and decentralized structures produce different communication patterns and different outputs as well.

In a combat environment these different patterns will result in distinct results in terms of effectiveness and efficiency. This environment can be modeled by the help of software like Arena. As a part of the Global War on Terrorism NATO forces are conducting operations in Afghanistan. To enhance stability in Afghanistan, NATO established PRTs (Provincial Reconstruction Teams) composed of multinational elements (partly civilian, but mostly military. These teams are static, and form potential targets for terrorist attacks. We will use PRTs in our model as the target of the terrorists and try to discriminate communication structures in these ambush scenarios.
DTIC
Simulation; Telecommunication; Terrorism

20080041337 Defence Research and Development Canada, Valcartier, Quebec Canada
Data Replication Over Disadvantaged Links: A Canadian Naval Perspective
Bycroft, John; Dec 1, 2007; 33 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483669; No Copyright; Avail.: Defense Technical Information Center (DTIC)
No abstract available
Canada; Communication Networks; Data Links; Information Management

20080041342 Naval Postgraduate School, Monterey, CA USA
Validating a Model of Team Collaboration at the North American Aerospace Defense Command Using Selected Transcripts from September 11, 2001
Donaldson, Catherine W; Johnson, David A; Jun 2008; 203 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483700; No Copyright; Avail.: Defense Technical Information Center (DTIC)
On September 11, 2001, during an exercise at the North American Aerospace Defense Command (NORAD), air traffic controllers in New York, Boston, Washington and Cleveland discovered that four American commercial airliners had been hijacked. Initially, the officials at NORAD's North East Air Defense Sector (NEADS) were confused as to whether the hijackings were real world or part of an exercise. The goal of this thesis is to investigate the teamwork and collaboration that occurred between NEADS, their counterparts at the Federal Aviation Administration (FAA) and various air traffic control centers in order to provide military air support and ground civilian air traffic over the USA. Transcripts of recorded audio from the command and control center at NEADS were coded and analyzed in an effort to use a real world example to empirically validate the structural model of team collaboration, developed by the Office of Naval Research. The model focuses on individual and team cognitive processes used during collaboration with the goal of understanding how individuals and teams work together under stress to make decisions.
DTIC
Air Defense; Cognition; Command and Control; Models

20080041442 Patti and Brill, Chicago, IL, USA; Northrop Grumman Corp., Rolling Meadows, IL, USA
Spatial Transmit/Receive Isolation Method for Optical Communication Systems
Ngo, K. D., Inventor; Dixon, D. P., Inventor; Schrier, S. B., Inventor; 22 Nov 04; 8 pp.; In English
Contract(s)/Grant(s): F04701-03-C-0006
Patent Info.: Filed Filed 22 Nov 04; US-Patent-Appl-SN-10-994 570
Report No.(s): PB2008-103833; No Copyright; Avail.: CASI: A02, Hardcopy
Apparatus, and a corresponding method, for spatially isolating a transmit beam and a receive beam, which, in satellite communication systems, are inherently separated by a look ahead angle. A receive beam separation mirror is positioned in the receive beam path but out of the transmit beam path, and the receive beam is reflected along a path separated from the transmit beam path. The mirror may be annular, allowing the transmit beam to be directed through the center of the mirror. In applications where a desired isolation angle is different from the look ahead angle, or where there is no look ahead angle, the receive beam separation mirror is used in conjunction with a dichroic beam splitter and at least one receive beam steering mirror, to achieve the desired angular separation.
NTIS
Isolation; Optical Communication; Patent Applications; Signal Reception; Telecommunication; Transmission; Transmitter Receivers

20080041577 NATO Research and Technology Organization, Neuilly-sur-Seine, France

Validation and Verification of NATO Network Enabled Capabilities: Final Report of Workshop SCI-189

July 2008; 22 pp.; In English; Original contains color illustrations

Report No.(s): RTO-TR-SCI-189; AC/323(SCI-189)TP/210; Copyright; Avail.: CASI: C01, CD-ROM: A03, Hardcopy

The purpose of this Workshop (WS) was to bring together members from participating NATO countries to discuss the Verification and Validation (V&V) of a NATO Network Enabled Capability. V&V must be built into the development of network enabled capabilities in an iterative approach starting with the initial concept of operations. Furthermore, as an NNEC collects, processes, integrates and disseminates information, the V&V of an NNEC in essence feeds the research and development of that NNEC. The workshop was convened at Edwards AFB, California, USA on 11-14 Sep 2007. Workshop participating countries included Canada, Estonia, Italy, Netherlands, Spain, Turkey, UK, and USA. The workshop discussed formulated a top level roadmap that included a working definition of NNEC for V&V, definition and prioritization of V&V capabilities, shortfalls, key players, initiatives, and future guidelines. It was agreed to initiate within Working Session C of the SCI panel the activities to address all of the above identified items. This effort should start with an immediate follow-on Task Group to work the details of a V&V of NNEC roadmap. A TAP/TOR for initial task group should be submitted in Oct 2007 for start in April 2008.

Author

Communication Networks; Security; Information Dissemination; Military Operations; North Atlantic Treaty Organization (NATO); Systems Engineering; Systems Analysis; Systems Integration

20080041672 Naval Postgraduate School, Monterey, CA USA

Enhanced Cyberspace Defense through Covert Publish-Subscribe Broker Pattern Communications

Paxton, Steven G; Jun 2008; 115 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483906; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483906

In this thesis, we propose a novel cyberspace defense solution to the growing sophistication of threats facing networks within the Department of Defense. Current network defense strategies, including traditional intrusion detection and firewall-based perimeter defenses, are ineffective against increasingly sophisticated social engineering attacks such as spear-phishing which exploit individuals with targeted information. These asymmetric attacks are able to bypass current network defense technologies allowing adversaries extended and often unrestricted access to portions of the enterprise. Network defense strategies are hampered by solutions favoring network-centric designs which disregard the security requirements of the specific data and information on the networks. Our solution leverages specific technology characteristics from traditional network defense systems and real-time distributed systems using publish subscribe broker patterns to form the foundation of a full-spectrum cyber operations capability. Building on this foundation, we present the addition of covert channel communications within the distributed systems framework to protect sensitive Command and Control and Battle Management messaging from adversary intercept and exploitation. Through this combined approach, DoD and Service network defense professionals will be able to meet sophisticated cyberspace threats head-on while simultaneously protecting the data and information critical to warfighting Commands, Services and Agencies.

DTIC

Command and Control; Military Operations; Telecommunication

20080041702 RAND Corp., Santa Monica, CA USA

The Media and Intra-Elite Communication in the USSR

Dzirkals, Lilita; Gustafson, Thane; Johnson, A R; Sep 1982; 155 pp.; In English

Report No.(s): AD-A483999; RAND/R-2869; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483999

This report tests basic assumptions used by Western analysts in interpreting the Soviet media by bringing to bear new information, derived from emigre interviews, about the structure and inner workings of Soviet media and the political mechanisms by which the media are controlled. Western Sovietologists have long considered the Soviet media to be their basic analytic source. They have based their analyses on the assumption that by reading properly 'between the lines' one can pick up real echoes of Soviet politics in action. Are such beliefs justified? To assert that the Western analyst is picking up real echoes, rather than noise or disinformation, implies certain basic assumptions about the way the Soviet media are managed. The Kremlinological school of analysis has generally assumed that not only differentiated verbal behavior of top leaders but any media differentiation on politically significant subjects is related to leadership controversy. The implicit assumption underlying most Western Kremlinological analyses is that continuous conflict among the top leadership prevents any one

element of that leadership, however powerful, from effectively utilizing the control/censorship mechanism to suppress partisan communication from other elements.
DTIC
News Media; U.S.S.R.

20080041828 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Signal Processing Design of Low Probability of Intercept Waveforms via Intersymbol Dither
Liefer, Nathaniel C; Mar 2008; 107 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484191; AFIT/GE/ENG/08-18; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This thesis investigates a modification to Differential Phase Shift Keyed modulation to create a low Probability of Interception/Exploitation communications signal. A Pseudodorandum timing offset is applied to each symbol in the communications stream to intentionally create intersymbol interference that hinders accurate symbol estimation and bit sequence recovery by a non-cooperative receiver. Two cooperative receiver strategies are proposed to mitigate the ISI due to symbol timing offset: a modified minimum Mean Square Error equalization algorithm and a multiplexed bank of equalizer filters determined by an adaptive Least Mean Square algorithm. Numerical simulation is used to demonstrate the bit error rate performance of cooperative receivers and notional non-cooperative receivers. Simulation results suggest that proper selection of pulse of pulse shape and probability distribution of symbol timing offsets produces a waveform that is accurately demonstrated by the proposed cooperative receivers and significantly degrades non-cooperative receiver symbol estimation accuracy.
DTIC
Dithers; Intersymbolic Interference; Phase Shift; Probability Theory; Signal Processing; Waveforms

20080041860 Marine Aircraft Group 11, San Diego, CA USA
MAGTF Area of Operations: Turf War or Doctrinal Necessity?
Kennedy, Michael R; Jan 2002; 6 pp.; In English
Report No.(s): AD-A484267; No Copyright; Avail.: Defense Technical Information Center (DTIC)

If given a mission and area of operations, Marine air-ground task forces (MAGTFs) fight as a whole by integrating ground maneuver, rotary and fixed wing aviation, and logistic support. The long-standing insistence by the Marine Corps on retaining operational control over aviation is legendary. Although the omnibus agreement was superseded by Joint Pub 0-2, 'The Unified Action Armed Forces' (UNAAF), its principles still apply. While recent joint operations have sought to improve efficiency by consolidating assets in blocks of like capabilities with functional componency, the Marine Corps is focused on tactical and operational integrity. Unfortunately, joint doctrine is vague on this point and questions surface regarding MAGTF battlespace: Where do the Marines get doctrinal authority to assume command and control over areas of operations? Does this authority include airspace? If not, how is it assigned? Is there a conflict with joint force air component commanders (JFACCs) in prosecuting targets? How do assigned MAGTFs fit into functionally organized joint forces?
DTIC
Command and Control; Military Aviation; Military Operations; Support Systems; Warfare

20080041888 Naval War Coll., Newport, RI USA
Effects-Based Operations at the Operational Level of War: Exploring the Living System Alternative
Dees, David S; Apr 24, 2008; 29 pp.; In English
Report No.(s): AD-A484328; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The concept of Effects-Based Operations (Effects-Based Approach to Operations) proves effective in a well-defined tactical environment, but less capable in the dynamic open environment at the operational level of war. Exploring the well-established relationship between control systems and EBO reveals fundamental problems with this concept in the areas of situation assessment, feedback, and prediction. The living system model provides an alternate construct for the environment found at the operational level of war. This model better represents the complex, open system found and is better able to overcome the disturbances that occur in open systems With robustly designed systems and sub-systems, the ability to synchronize C2 at the organism and sub-system levels, and the acceptance of limitations in areas such as situation assessment and feedback, the living system model provides a better construct for defeating adversaries of all abilities.
DTIC
Control; Warfare

20080041890 Naval War Coll., Newport, RI USA
Enhancing Submarine Operational Relevance: A Leadership Challenge
Daigle, Jr, Michael J; Apr 23, 2008; 21 pp.; In English
Report No.(s): AD-A484341; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The submarines of the U.S. Navy have normally been utilized as independent strategic assets throughout the history of the force. This vision of submarine operations must change. As the military continues to shift to operations focused on joint capabilities, the submarine force must break from the closed, protective, and risk averse culture of its past and push forward to increase its relevance to the operational commander. This break from the past must be embraced and led from the top. This paper begins with a brief background to provide the reader with the historical underpinnings of the problem as well as some insight into the development of today's submarine culture. The author then discusses the various problems inherent in submarine operations and culture, and highlights specific roadblocks that continue to prevent these problems from being addressed. He then explores the possibility that the problem really isn't a submarine force leadership problem, but a problem rooted in the operational commander's utilization of submarines. He concludes with several recommendations for change.
DTIC
Command and Control; Leadership; Submarines; Warfare

20080042093 University of Southern California, Los Angeles, CA USA
Speechlinks: Robust Cross-Lingual Tactical Communication Aids
Narayanan, Shrikanth; Georgiou, Panayiotis; Jun 2008; 194 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-06-1-0250; Proj-TRAN
Report No.(s): AD-A483766; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483766

This project was directed toward developing a unique tactical language translator with context-aware, mixed-initiative capability for tactical missions. The specific goals were to: 1) enable robust mixed-initiative tactical communication targeting multiple languages, 2) develop algorithms and tools that enable rapid construction and deployment of systems for new missions and languages, and 3) develop and implement a holistic evaluation process for cross-lingual communication systems that unifies usability, task achievement and cost.
DTIC
Speech Recognition; Translating

20080042128 Naval Postgraduate School, Monterey, CA USA
Interoperability: Stop Blaming the Radio
Timmons, Ronald P; Feb 2007; 18 pp.; In English
Report No.(s): AD-A484120; No Copyright; Avail.: Defense Technical Information Center (DTIC)

One of the most pressing first responder issues emerging in the post-9/11 era is the need to improve emergency scene radio communications. This concern actually pre-dates the terrorist attacks on the USA in 2001, and has been a commonly cited issue, in dealing with nearly every disaster or incident of major significance, for many years. The one word repeatedly heard in describing the problems relating to disaster scene communications is interoperability. Without full consideration of all the causal factors, the charge has been to fix the oft-cited frustration of field responders being unable to communicate and all the blame has gone to interoperability. The 9/11 attacks were a catalyst for an unprecedented amount of money spent on radio hardware. The numbers are staggering: estimates range up to five billion dollars in homeland security grants to enable and facilitate emergency communications. Hurricane Katrina in 2005 again sent first responders looking for communications improvements. This article challenges first responders to look beyond technical solutions and consider other factors impeding emergency scene communications.
DTIC
Disasters; Emergencies; Interoperability; Telecommunication

20080042130 Naval Postgraduate School, Monterey, CA USA
Maritime Critical Infrastructure Protection: Multi-Agency Command and Control in an Asymmetric Environment
Watts, Robert B; Jan 2005; 13 pp.; In English
Report No.(s): AD-A484165; No Copyright; Avail.: Defense Technical Information Center (DTIC)

As a maritime nation, the USA is economically and strategically reliant on its ports, a fact well known to our potential enemies in the Global War on Terrorism. A successful attack against maritime critical infrastructure in our ports has the

potential to cause major economic disruption and create mass casualties and conflagration. The USA has faced military threats in its littoral zones before, and lessons from the past offer value in determining how to defend ports in the modern era. But these lessons must be considered in light of the new asymmetric terrorist threat. By examining lessons from the past and considering current maritime multi-agency capabilities, a logical command and control solution can be devised to effectively fuse agency efforts in tactical defense of maritime critical infrastructure.
DTIC
Asymmetry; Command and Control; Harbors; Protection; Security

20080042142 Wells Saint John, PS, Spokane, WA, USA
RFID Tag Modificaiton for Full Depth Backscatter Modulation
Scott, J. W., Inventor; Pratt, R. M., Inventor; 4 Jan 05; 11 pp.; In English
Contract(s)/Grant(s): DE-AC0676RL01830
Patent Info.: Filed Filed 4 Jan 05; US-Patent-Appl-SN-11-029 841
Report No.(s): PB2008-104534; No Copyright; Avail.: CASI: A03, Hardcopy

A modulated backscatter radio frequency identification device includes a diode detector configured to selectively modulate a reply signal onto an incoming continuous wave; communications circuitry configured to provide a modulation control signal to the diode detector, the diode detector being configured to modulate the reply signal in response to be modulation control signal; and circuitry configured to increase impedance change at the diode detector which would otherwise not occur because the diode detector rectifies the incoming continuous wave while modulating the reply signal, whereby reducing the rectified signal increases modulation depth by removing the reverse bias effects on impedance changes. Methods of improving depth of modulation in a modulated backscatter radio frequency identification device are also provided.
NTIS
Backscattering; Depth; Modulation; Patent Applications; Radio Frequencies

20080042263 Army Medical Research and Materiel Command, Fort Detrick, MD, USA
Supporting Connectivity for Biomedical Research Executive Session Final Workshop Report. Held in Arlington, Virginia on April 24, 2006
Sep. 2006; 39 pp.; In English; Supporting Connectivity for Biomedical Research Executive Session Final Workshop Report., April 24, 2006, Arlington, Virginia
Report No.(s): PB2008-104202; No Copyright; Avail.: CASI: A03, Hardcopy

High-speed computer networks are vital to biomedical research, yet the infrastructure supporting network connectivity remains unevenly distributed. This workshop joined together biomedical researchers, networking experts, and computer scientists from across the country to identify key challenges to improving network connectivity and utilization across a broad spectrum of users, including those with ready access to cutting-edge networks and those with little or no connectivity. A draft whitepaper developed by NCRR, TATRC, and Internet2 staff, with help from experts in relevant fields was circulated to participants prior to the workshop to frame to discussions at the executive session. The charge to the group at the executive session was to identify key needs and priorities for cyberinfrastructure development during the next three to five years and to examine best practices for implementing collaborative networks driven by research opportunities across the health research spectrum.
NTIS
Biomedical Data; Computer Networks; Medical Science

20080042268 Watov and Kipnes, PC, Princeton Junction, NJ, USA
High Performance, High Efficiency Fiber Optic Link for Analog and RF Systems
Paolella, A. C., Inventor; 23 Dec 04; 30 pp.; In English
Contract(s)/Grant(s): NR003-03-C-0301
Patent Info.: Filed Filed 23 Dec 04; US-Patent-Appl-SN-11-022 436
Report No.(s): PB2008-103931; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention relates generally to communication and radar systems, and more particularly to fiber optic communication systems. A fiber optic link is provided that is receptive of an AM RF input signal, includes an analog comparator for comparing the input signal with a triangle waveform to convert the input signal to a PWM signal. The PWM signal is converted into an optical signal, and transmitted over a fiber optic cable to an optical receiver. The optical receiver converts the optical signal back into a PWM signal, which is amplified via a Class D amplifier. The amplified PWM signal

is passed through a low pass filter for converting it into an AM RF output signal having a predetermined power level, the output signal corresponding to the AM RF input signal.
NTIS
Data Links; Fiber Optics; Radio Frequencies; Systems Engineering; Optical Properties; Analog Data

20080042291 Hamilton, Brook, Smith and Reynolds, Concord, MA, USA; Massachusetts Inst. of Tech., Cambridge, MA, USA
Multi-Channel DPSK Receiver (PAT-APPL-11-022 344)
Caplan, D. O., Inventor; 23 Dec 04; 19 pp.; In English
Contract(s)/Grant(s): F19628-00-C-0002
Patent Info.: Filed Filed 23 Dec 04; US-Patent-Appl-SN-11-022 344
Report No.(s): PB2008-103924; No Copyright; Avail.: CASI: A03, Hardcopy

An optical, multi-channel, Differential Phase Shift Keying (DPSK) receiver demodulates multiple Wavelength Division Multiplexed (WDM) channels using a single interferometer. This distributes expense of the interferometer over all channels of an optical signal, allowing for deployment of cost-effective, scalable, wideband, WDM DPSK systems. For example, for an 80 channel WDM link, the receiver uses a single interferometer instead of eighty interferometers and associated stabilization hardware, dramatically reducing size, weight, power, and cost. The receiver is architecturally compatible with existing interferometer technologies so previous development and qualification efforts can be leveraged. This allows for expedited technology insertion into existing optical communications networks, including terrestrial and space-based optical networks.
NTIS
Patent Applications; Phase Shift; Phase Shift Keying; Receivers

20080042340 Association for Supervision and Curriculum Development, Washington, DC, USA
Connected Teaching: Helping Students Make Positive Choices. Educator's Resource Guide
January 2000; 32 pp.; In English
Report No.(s): PB2008-104266; Copyright; Avail.: National Technical Information Service (NTIS)

The Connected Teaching project came about because of concerns shared by the three project partners Cable in the Classroom, the Association for Supervision and Curriculum Development (ASCD), and the White House Office of National Drug Control Policy (ONDCP)about the alarming number of kids using alcohol and drugs. After a substantial decline throughout the 1980s, drug use among youth has been on the rise since 1991, according to the Monitoring the Future study (Johnston, OMalley, & Bachman, 1997). Poor academic performance and low educational aspiration have also been shown to be associated with drug use (Newcomb & Felix-Ortiz, 1992). As teachers on the front lines, you can put faces on these statistics. The good news is that, with good resources and strong support, educators can help reverse this disturbing trend.
NTIS
Alcohols; Drugs; Education; Students; Youth

20080042364 Government Accountability Office, Washington, DC, USA
Digital Television Transition: Increased Federal Planning and Risk Management Could Further Facilitate the DTV Transition
Nov. 2007; 54 pp.; In English
Report No.(s): PB2008-105024; GAO-08-43; No Copyright; Avail.: CASI: A04, Hardcopy

The Digital Television Transition and Public Safety Act of 2005 requires all full-power television stations to cease analog broadcasting by February 17, 2009. Following this digital television transition, consumers who receive over-the-air television signals on analog sets will need to take action to be able to view digital broadcasts. The act also requires the National Telecommunications and Information Administration (NTIA) to create a program that subsidizes consumers' purchases of digital-to-analog converter boxes. This requested report examines progress made (1) by federal entities and others in facilitating the transition, (2) in educating consumers on the transition, and (3) in implementing the converter box subsidy program. GAO reviewed legal, agency, and industry documents; interviewed public, private, and other stakeholders; and convened an expert panel focused on consumer outreach.
NTIS
Broadcasting; Communication Cables; Consumers; Digital Television; Education; Industries; Risk Management; Telecommunication; Television Systems

33
ELECTRONICS AND ELECTRICAL ENGINEERING

Includes development, performance, and maintainability of electrical/electronic devices and components; related test equipment; and microelectronics and integrated circuitry. for related information see also *60 Computer Operations and Hardware*; and *76 Solid-State Physics*. For communications equipment and devices see *32 Communications and Radar*.

20080040808 Harness, Dickey and Pierce, PLC, Bloomfield Hills, MI, USA
Forming and Bonding of Flex Circuits to Structures
Navarro, J., Inventor; Bostwick, R. N., Inventor; Bolster, M. S., Inventor; 17 Nov 04; 14 pp.; In English
Contract(s)/Grant(s): N6601-99-C-6001
Patent Info.: Filed Filed 17 Nov 04; US-Patent-Appl-SN-10-991 291
Report No.(s): PB2008-103790; No Copyright; Avail.: CASI: A03, Hardcopy

An apparatus and method for forming and bonding of flexible circuits to metal structures includes a clamping frame having a removable frame portion. At least one flexible roller fixture provides opposed flexible rollers. A clearance aperture in the roller fixture is sized to slidably receive the clamping frame. As the clamping frame is inserted through the clearance aperture of the roller fixture the opposed flexible rollers apply a continuous pressure to deflect the flexible circuit. A curing clamp is then connected to the clamping frame having at least one engagement face defining a flexible circuit finished shape. The flexible circuit is then heat cured to adhesively bond to the metal structure.
NTIS
Bonding; Circuits; Clamps; Patent Applications

20080040809 Honeywell International, Inc., Morristown, NJ, USA
Chip Packaging Systems and Methods
DCamp, J. B., Inventor; Curtis, H. L., Inventor; Dunaway, L. A., Inventor; Glenn, M. C., Inventor; 15 Nov 04; 11 pp.; In English
Contract(s)/Grant(s): F33615-01-2-5705
Patent Info.: Filed Filed 15 Nov 04; US-Patent-Appl-SN-10-988 799
Report No.(s): PB2008-103789; No Copyright; Avail.: CASI: A03, Hardcopy

An automated process for performing MEMS packaging including automatically attaching a die to a chip carrier, resulting in a chip carrier assembly, automatically moving the chip carrier assembly into a vacuum chamber, wherein the vacuum chamber includes one or more lids therein, automatically securing a lid to the chip carrier assembly within the vacuum chamber, thereby forming a packaged die, and automatically removing the packaged die from the vacuum chamber. Unique vacuum chambers suitable for MEMS packaging are also disclosed.
NTIS
Chips; Microelectromechanical Systems; Packaging; Patent Applications; Vacuum

20080040818 SEMATECH, Albany, NY, USA; California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Detectability and Printability of EUVL Mask, Blank Defects for the 32 nn HP Node
Cho, W.; Han, H. S.; Goldberg, K. A.; Kearney, P. A.; Jeon, C. U.; Aug. 2007; 9 pp.; In English
Report No.(s): DE2007-918124; LBNL-63508; No Copyright; Avail.: National Technical Information Service (NTIS)

The readiness of a defect-free extreme ultraviolet lithography (EUVL) mask blank infrastructure is one of the main enablers for the insertion of EUVL technology into production. It is essential to have sufficient defect detection capability and understanding of defect printability to develop a defect-free EUVL mask blank infrastructure. The SEMATECH Mask Blank Development Center (MBDC) has been developing EUVL mask blanks with low defect densities with the Lasertec M1350 and M7360, the 1st and 2nd generations, respectively, of visible light EUVL mask blank inspection tools. Although the M7360 represents a significant improvement in our defect detection capability, it is time to start developing a 3rd generation tool for EUVL mask blank inspection. The goal of this tool is to detect all printable defects; therefore, understanding defect printability criteria is critical to this tool development. In this paper, we will investigate the defect detectability of a 2nd generation blank inspection tool and a patterned EUVL mask inspection tool. We will also compare the ability of the inspection tools to detect programmed defects whose printability has been estimated from wafer printing results and actinic aerial images results.
NTIS
Defects; Detection; Masking; Lithography

20080040849 NanoSystems, Inc., Palo Alto, CA, USA

Photoactive Devices and Components with Enhanced Efficiency

Parce, J. W., Inventor; Chow, C. Y. H., Inventor; Meisel, A. P., Inventor; Nguyen, L., Inventor; Scher, E. C., Inventor; 10 Nov 05; 21 pp.; In English

Contract(s)/Grant(s): NRO-000-01-C-0130

Patent Info.: Filed Filed 10 Nov 05; US-Patent-Appl-SN-11-271 484

Report No.(s): PB2008-104358; No Copyright; Avail.: CASI: A03, Hardcopy

Devices, compositions and methods for producing photoactive devices, systems and compositions that have improved conversion efficiencies relative to previously described devices, systems and compositions. This improved efficiency is generally obtained by one or both of improving the efficiency of light absorption into the photoactive component, and improving the efficiency of energy extraction from that active component.

NTIS

Efficiency; Patent Applications

20080040864 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Radiation Testing, Characterization and Qualification Challenges for Modern Microelectronics and Photonics Devices and Technologies

LaBel, Kenneth A.; Cohn, Lewis M.; March 17, 2008; 16 pp.; In English; Government Microcircuit Applications and Critical Technology Conference (GOMAC), 17 -20 Mar. 2008, Las Vegas, NV, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080040864

At an earlier conference we discussed a selection of the challenges for radiation testing of modern semiconductor devices focusing on state-of-the-art CMOS technologies. In this presentation, we extend this discussion focusing on the following areas: (1) Device packaging, (2) Evolving physical single even upset mechanisms, (3) Device complexity, and (4) the goal of understanding the limitations and interpretation of radiation testing results.

Derived from text

Microelectronics; Photonics; Electronic Packaging; Single Event Upsets; Radiation Damage; Performance Tests

20080040866 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Risk Reduction for Use of Complex Devices in Space Projects

Berg, Melanie; Poivey, Christian; Friendlich, Mark; Petrick, Dave; LaBel, Kenneth; Stansberry, Scott; July 23, 2007; 18 pp.; In English; IEEE Nuclear and Space Radiation Effects Conference (NSREC), 23-27 Jul. 2007, Honolulu, HI, USA; Original contains poor quality, truncated or crooked pages

Contract(s)/Grant(s): IACRO# 07-4207I; Copyright; Avail.: CASI: A03, Hardcopy

We present guidel!nes to reduce risk to an acceptable level when using complex devices in space applications. Application to Virtex 4 Field Programmable Gate Array (FPGA) on Express Logistic Carrier (ELC) project is presented.

Author

Field-Programmable Gate Arrays; Risk; Risk Management; Aerospace Environments; Chips (Electronics); Spacecraft Electronic Equipment; Performance Tests

20080040925 Day (Jones), Pittsburgh, PA, USA

Built-In Self Test of MEMS

Deb, N., Inventor; Blanton, R. D., Inventor; 8 Mar 06; 16 pp.; In English

Contract(s)/Grant(s): MIP-9702678

Patent Info.: Filed Filed 8 Mar 06; US-Patent-Appl-SN-11-370 818

Report No.(s): PB2008-103724; No Copyright; Avail.: CASI: A03, Hardcopy

The present disclosure is directed to an apparatus and method for producing and comparing signals from various points in a MEMS device. By producing signals which should be of substantial identical characteristics, deviations from the situation where the signals are of identical characteristics can be used to identify various types of asymmetry which are otherwise difficult to detect. In one embodiment, the MEMS device is comprised of a plurality of fixed beams arranged symmetrically and a plurality of movable beams arranged symmetrically. A first sensor is formed by certain of the fixed and movable beams while a second sensor, electrically isolated from said first sensor, is formed by at least certain other of the fixed and movable beams. The first and second sensors are located within the MEMS device so as to produce signals of substantially identical

characteristics. A circuit is responsive to the first and second sensors for comparing the signals produced by the first and second sensors. In addition to the apparatus, methods of performing a self test are also disclosed, which may be performed in real time.
NTIS
Microelectromechanical Systems; Patent Applications

20080040936 Crilly (Michael G), Esq.,, Hartboro, PA, USA
Ifrared Detector Composed of Group III-V Nitrides
Qiu, C. H., Inventor; 24 Nov 04; 10 pp.; In English
Contract(s)/Grant(s): DMI-0318901
Patent Info.: Filed Filed 24 Nov 04; US-Patent-Appl-SN-10-996 766
Report No.(s): PB2008-103817; No Copyright; Avail.: CASI: A02, Hardcopy

A quantum-well infrared photodetector (QWIP) is presented. The photodetector includes a substrate, a buffer layer, a first conductive layer, a multiple quantum well, an optional blocking layer, and a second conductive layer. Substrate is composed of a monocrystal which may be removed after fabrication. Remaining layers are composed of group III-V nitrides, including binary, ternary, and quaternary compositions. Alternate embodiments of the present invention include a doped binary alloy along first and second conductive layers, a binary alloy along buffer and blocking layers, and alternating alloys of binary, ternary and quaternary compositions within the multiple quantum well. The present invention responds to infrared light at normal and oblique incidences, from near infrared to very far infrared.
NTIS
Infrared Detectors; Nitrides; Patent Applications; Photometers

20080040939 Summa, Allan and Addition, PA, Charlotte, NC, USA
One Hundred Millimeter Single Crystal Silicon Carbide Wafer
Hobgood, H. M., Inventor; Jenny, J. R., Inventor; Malta, D. P., Inventor; Tsvetkov, V. F., Inventor; Carter, C. H., Inventor; 12 Oct 05; 29 pp.; In English
Contract(s)/Grant(s): N00014-02-C-0306
Patent Info.: Filed Filed 12 Oct 05; US-Patent-Appl-SN-11-248 458
Report No.(s): PB2008-103813; No Copyright; Avail.: CASI: A03, Hardcopy

A method is disclosed for producing a high quality bulk single crystal of silicon carbide in a seeded growth system. The method includes positioning a seed crystal on the seed holder with a low porosity backing material that provides a vapor barrier to silicon carbide sublimation from the seed and that minimizes the difference in thermal conductivity between the seed and the backing material to minimize or eliminate temperature differences across the seed and likewise minimize or eliminate vapor transport from the rear of the seed that would otherwise initiate and propagate defects in the growing crystal.
NTIS
Millimeter Waves; Patent Applications; Silicon Carbides; Single Crystals; Wafers

20080040940 Lawrence Livermore National Lab., Livermore, CA USA; California Univ., Berkeley, CA, USA
Microelectromechanical Systems Contact Stress Sensor
Kotovsky, J., Inventor; 1 Jun 05; 18 pp.; In English
Contract(s)/Grant(s): W-7405-ENG-48
Patent Info.: Filed Filed 1 Jun 05; US-Patent-Appl-SN-11-143 543
Report No.(s): PB2008-103811; No Copyright; Avail.: CASI: A03, Hardcopy

A microelectromechanical systems stress sensor comprising a microelectromechanical systems silicon body. A recess is formed in the silicon body. A silicon element extends into the recess. The silicon element has limited freedom of movement within the recess. An electrical circuit in the silicon element includes a piezoresistor material that allows for sensing changes in resistance that is proportional to bending of the silicon element.
NTIS
Electromechanical Devices; Microelectromechanical Systems; Microelectronics; Patent Applications

20080041038 Public Health Inst., Berkeley , CA, USA
Fatality Assessment and Control Evaluation (FACE) Report for California: A Hotel Maintenance Worker Died From Injuries Received From an Electrical Flash
Aug. 2007; 5 pp.; In English
Report No.(s): PB2008-102555; FACE-06-CA-008; No Copyright; Avail.: CASI: A01, Hardcopy

A 39-year-old Hispanic hotel maintenance worker died from an inhalation injury and an electrical flash burn to

approximately 20 percent of his body, face, and arms. The victim was changing a fuse in an electrical panel when the incident occurred. The garage area of the hotel had lost electrical power and the assistant general manager for the hotel told the victim to 'check out' the problem. The victim was not trained to do electrical work. The victim contacted the maintenance supervisor by telephone for guidance. According to the maintenance supervisor, he instructed the victim not to touch the electrical fuses. The victim proceeded to try to change the fuse. The power was not shut off and there was no lockout/tagout applied when the electrical flash occurred. The CA/FACE investigator determined that, in order to prevent future occurrences, employers, as part of their Injury and Illness Prevention Program (IIPP) should: (1) Ensure workers only perform tasks that are part of their well-defined duties.
NTIS
Accident Investigation; Injuries; Maintenance

20080041057 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Assessment of Proper Bonding Methods and Mechanical Characterization FPGA CQFPs
Davis, Milton C.; September 15, 2008; 22 pp.; In English; Military and Aerospace Programmable Logic Devices (MAPLD) Conference, 15-18 Sep. 2008, Annapolis, MD, USA; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041057

This presentation discusses fractured leads on field-programmable gate array (FPGA) during flight vibration. Actions taken to determine root cause and resolution of the failure include finite element analysis (FEA) and vibration testing and scanning electron microscopy (with X-ray microanalysis) and energy dispersive spectrometry (SEM/EDS) failure assessment. Bonding methods for surface mount parts is assessed, including critical analysis and assessment of random fatigue damage. Regarding ceramic quad flat pack (CQFP) lead fracture, after disassembling the attitude control electronics (ACE) configuration, photographs showed six leads cracked on FPGA RTSX72SU-1 CQ208B package located on the RWIC card. An identical package (FPGA RTSX32SU-1 CQ208B) mounted on the RWIC did not results in cracked pins due to vibration. FPGA lead failure theories include workmanship issues in the lead-forming, material defect in the leads of the FPGA packages, and the insecure mounting of the board in the card guides, among other theories. Studies were conducted using simple calculations to determine the response and fatigue life of the package. Shorter packages exhibited more response when loaded by out-of-plane displacement of PCB while taller packages exhibit more response when loaded by in-plane acceleration of PCB. Additionally, under-fill did not contribute to reducing stress in leads due to out-of-plane PCB loading or from component twisting, as much as corner bonding. The combination of corner bond and under-fill is best to address mechanical and thermal S/C environment. Test results of bonded parts showed reduced (dampened) amplitude and slightly shifted peaks at the un-bonded natural frequency and an additional response at the bonded frequency. Stress due to PCBB out-of-plane loading was decreased on in the corners when only a corner bond was used. Future work may address CQFP fatigue assessment, including the investigation of discrepancy in predicted fatigue damage, as well as comparing fatigue life and fatigue damage cycle ration computed using FEA and Miner's rule to results from a fatigue assessment software program.
Derived from text
Circuit Boards; Field-Programmable Gate Arrays; Semiconductor Devices; Ceramics; Fractures (Materials); Beam Leads; Bonding; Structural Vibration; Failure Analysis

20080041060 Naval Research Lab., Washington, DC USA
Measurements of Low-Level Prepulse on Nike KrF Laser (Preprint)
Karasik, Max; Mostovych, A N; Lehmberg, R H; Chan, Y; Weaver, J L; Aug 15, 2005; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483126; XB-NRL/MR/6700; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483126

The krypton fluoride (KrF) laser is a leading candidate driver for inertial fusion energy. Some of the current fusion target designs call for targets with thin metallic coatings. These targets could be particularly susceptible to preheat by a low-level laser prepulse. Knowledge of the prepulse can be important in understanding and modeling the behavior of such targets. This paper presents measurements of low-level prepulse on target with the Nike KrF laser. Sources of prepulse are discussed and measurements are performed under several specific laser conditions in order to evaluate the relative contribution of these sources to the overall prepulse. Prepulse is found to be approx. 2 x 10(-7) from peak intensity for approximately 120 ns prior

to the main laser pulse. Prepulse energy density on target is approx. 2 J/cm(2). The first laser amplifier in the time- and angle-multiplexed section of the laser is found to be the dominant source of prepulse.
DTIC
Krypton Fluoride Lasers; Lasers

20080041063 Naval Research Lab., Washington, DC USA
Structure and Stability of Si(114)-(2 x 1)
Erwin, S C; Baski, A A; Whitman, L J; Jul 22, 1996; 5 pp.; In English
Report No.(s): AD-A483139; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483139

We describe a recently discovered stable planar surface of silicon Si(114) This high-index surface, oriented 19.5 degrees away from (001) toward (111), undergoes a 2 x 1 reconstruction. We propose a complete model for the reconstructed surface based on scanning tunneling microscopy images and first-principles total-energy calculations. The structure and stability of Si(114)-(2 x 1) arises from a balance between surface dangling bond reduction and surface stress relief, and provides a key to understanding the morphology of a family of surfaces oriented between (001) and (114).
DTIC
Planar Structures; Stability

20080041073 Houston Univ., TX USA
Lateral Composition Modulation in InAs/GaSb Superlattices
Stokes, D W; Forrest, R L; Li, J H; Moss, S C; Nosho, B Z; Bennett, B R; Whitman, L J; Goldenberg, M; Jan 1, 2003; 6 pp.; In English
Contract(s)/Grant(s): DMR-0099573
Report No.(s): AD-A483171; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483171

We report the analysis of lateral composition modulation in (InAs)m/(GaSb)m superlattices by x-ray diffraction. Vertical and lateral satellite peaks for a 140 period structure were observed. The lateral modulation wavelength, average superlattice composition, and vertical superlattice wavelength were determined. The lateral modulation was observed only along one in-plane direction resulting in quantum wire-like structures along the [110] direction. The unconventional structure of the lateral composition modulation, in which the stacking of the layers leads to a doubling of the vertical superlattice period, is discussed.
DTIC
Gallium Antimonides; Modulation; Morphology; Superlattices

20080041085 Texas Univ., Arlington, TX USA
Optical Add-Drop Filters Based on Photonic Crystal Ring Resonators
Qiang, Zexuan; Zhou, Weidong; Soref, Richard A; Feb 19, 2007; 10 pp.; In English
Contract(s)/Grant(s): FA9550-06-1-0482; DMI-0625728; Proj-2305
Report No.(s): AD-A483193; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483193

We present here an optical add-drop filter (ADF) design based on ultra-compact photonic crystal ring resonators (PCRRs). The normalized transmission spectra for single-ring and dual-ring configurations have been investigated by using the two-dimensional finite-difference time-domain (FDTD) technique in a square lattice dielectric-rod photonic-crystal structure. With the introduction of four scatterers at the corners of quasisquare-ring PCRR, high wavelength selectivity and close to 100% drop efficiency can be obtained. Both backward- and forward-dropping were achieved by controlling the coupling efficiency between two PCRR rings for resonant modes with different symmetry. The resonant-mode quality factor Q and the wavelength tunability were also analyzed, opening opportunities for PCRRs as ultra-compact filters, optical add-drop multiplexers, electrooptical N x N switches and electrooptical modulators.
DTIC
Crystals; Electro-Optics; Integrated Circuits; Integrated Optics; Modulators; Multiplexing; Optical Equipment; Optical Filters; Resonators

20080041098 Nottingham Univ., UK

Power Converters

Wheeler, Pat; Clare, Jon; Empringham, Lee; Trentin, Andrew; Jun 30, 2008; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N62558-07-C-0002

Report No.(s): AD-A483216; RK1304; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483216

This report summaries the work carried out under the current Matrix Converter contract. During this period the work on the project focused on two packages of work with the objective of furthering the work on the high power inverter at ARL. The first strand of this work involves using the TI C6713 control platform and the high power inverter to control of a generator for testing on the SIL. The second strand of work is focused on supporting the miniaturization of the control platform through interaction with a third party company and developing the required interfaces for testing the inverter and control platform at the SIL in order to control both the induction motor and the generator.

DTIC

Control; Miniature Electronic Equipment; Power Converters

20080041120 Stanford Univ., Pacific Grove, CA USA

Accelerating Electronic Tag Development for Tracking Free-Ranging Marine Animals at Sea

Block, Barbara; Costa, Daniel; Jan 2003; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-03-1-0325; N00014-02-1-1012

Report No.(s): AD-A483267; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483267

The work is focused on improving and testing the use and application of existing electronic tags and developing new, more complex hardware and software. For currently available archival and satellite tags we are 1) testing performance and durability, 2) improving light based geolocation estimates using sea surface temperature, 3) determining whether light levels recorded by archival tags can be used to estimate chlorophyll alpha concentrations, 4) examining the use of stomach temperature tags to document feeding behavior, and 5) testing light based geolocation for use on birds. New tag technologies under development include a conductivity, temperature, depth (CTD) sensors for both archival and satellite tags and a GPS tag. Refine and develop electronic tagging technologies for Tagging of Pacific Pelagics (TOPP), a pilot program of the Census of Marine Life (CoML). The tags under development will enable the project to address more complex questions about marine predators and their environment and collect high quality environmental data for integration into oceanographic databases.

DTIC

Global Positioning System; Marine Biology; Marking; Rangefinding; Seas

20080041141 Library of Congress, Washington, DC USA

Nanotechnology and U.S. Competitiveness: Issues and Options

Sargent, John F; May 15, 2008; 31 pp.; In English

Report No.(s): AD-A483318; CRS-RL34493; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483318

The projected economic and societal benefits of nanotechnology have propelled global investments by nations and companies. The USA launched the first national nanotechnology initiative in 2000. Since then, more than 60 nations have launched similar initiatives. In 2006, global public investment in nanotechnology was estimated to be $6.4 billion, with an additional $6.0 billion provided by the private sector. More than 600 nanotechnology products are now in the market, generally offering incremental improvements over existing products. However, proponents maintain that nanotechnology research and development currently underway could offer revolutionary applications with significant implications for the U.S. economy, national and homeland security, and societal well-being. These investments, coupled with nanotechnology's potential implications, have raised interest and concerns about the U.S. competitive position.

DTIC

Nanotechnology; United States

20080041232 University of Central Florida, Orlando, FL USA

Femtosecond Laser Passivation of GaAs Detector Material

Richardson, Martin; Boreman, Glenn; Richardson, Kathleen; Jun 7, 2008; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-0397

Report No.(s): AD-A483404; No Copyright; Avail.: Defense Technical Information Center (DTIC)

As devices become physically thinner, the surface to volume ratio becomes larger, so the control of surface properties becomes increasingly important. The device surface needs to be passivated in order to reduce electronically active surface states that cause noise. This seedling grant studies a new approach to passivating surfaces and has great Air Force relevance due to its importance in making smaller electronic devices. The objective is to explore the potential of using novel femtosecond laser techniques to passivate device surfaces. The approach is to perform noise spectral density measurements and selected materials structure measurements on GaAs detector materials, with and without passivation layers, both before and after femtosecond laser irradiation.

DTIC

Gallium Arsenides; Laser Applications; Passivity; Photoconductors

20080041239 North Carolina State Univ., Raleigh, NC USA

Losses and Degradation in Nanoscale Frequency Control Resonator

Iafrate, G J; Kiselev, A A; Feb 7, 2007; 21 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-06-1-0491

Report No.(s): AD-A483438; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The objective is to identify loss and degradation mechanisms relevant to the frequency control resonator performance as the resonator dimensions reduce to the nanodimensional spatial scale. The Department of Army interest in scaling such devices into the nanodimensional region stems from the technical projection that such resonators can operate at frequencies into the low GHz spectral region thus providing a low cost, integratable NEMS solid state device option for frequency control electronic applications relevant to secure communications. The key questions regarding NEMS resonator performance are the fundamental physical limitations that arise in quality factor Q and noise figure as the resonator is reduced to nanodimensions in order to achieve the higher frequencies of device operation. Such physical limitations may also present barriers in other NEMS smart actuator and sensor electronic device applications. The technical approach considers non-equilibrium heat generation and redistribution processes from mechanical strain during high frequency NEMS operation beyond the conventional heat diffusion and local temperature approximation. A semiclassical phonon dynamical picture is introduced to go beyond the conventional models. Scaling laws relevant to the appropriate phonon transport regimes and their transition boundaries are delineated, analyzed, and compared with results of detailed microscopic descriptions. Thus, the research approach involves scaling analysis, coupled with analytical and numerical modeling of phonon flow and heat redistribution in nanoscale resonators.

DTIC

Degradation; Frequency Control; Nanotechnology; Resonators

20080041241 SRI International Corp., Menlo Park, CA USA

Spin-Precession Organic Magnetic Sensor

Krishnamurthy, Srini; Apr 11, 2008; 43 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-06-C-0183

Report No.(s): AD-A483440; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The three major tasks we addressed in this project were to: (a) identify the issues for demonstration of a polymer-based spin-precession magnetic sensor; (b) develop theoretical and computational techniques to study the effect of the interface between ferromagnetic metal and polymers for FET applications; and (c) apply the existing light propagation codes to study transmission of 1.5 micron wavelength light through GaAs. We have completed all three tasks, and the major results of our 18-month effort are: (1) Detailed device modeling confirms that a room temperature detectivity of ~ 50 fT/square root of Hz is possible with an appropriately fabricated polymer magnetic sensor. (2) Self-consistent charge and spin transport calculations indicate that doping concentrations and field-dependent mobility in the polymer and Schottky barrier height with the contacts can be optimized for enhanced field effect transistor performance and magnetic sensor sensitivity. (3) La0.7Sr0.3MnO3 (LSMO) is demonstrated to be a ferromagnetic metal at room temperature. (4) Focused ion beam (FIB) lithography has been used to fabricate ultra-narrow trenches required for high-performance magnetic sensors, but the use of Ga+ ions in the FIB oxidizes the ferromagnetic surface and prevents spin or charge injection from half-metal La0.7Sr0.3MnO3 (LSMO). (5) We

demonstrated the synthesis of very low mobility but heavily doped polymers and used them in magnetic sensor fabrication. (6) We calculated two-photon and free carrier absorption coefficients and changes to the refractive index used in light propagation codes and concluded that GaInAs alloy is a better limiting material at 1.5 micron than GaAs. This report discusses our results and conclusions on key requirements.
DTIC
Field Effect Transistors; Precession

20080041293 Naval Postgraduate School, Monterey, CA USA
Design, Analysis and Construction of a High Voltage Capacitor Charging Supply
Tyler, Nathan; Jun 2008; 97 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483580; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The desire to use railguns in defense applications has elevated the level of concentration in all areas of the railgun system. Necessary in any railgun is a large amount of electric power to deliver the required force to the projectile. One popular source of power is high voltage capacitor banks. The NPS railgun Lab employs a fully functioning railgun with capacitor banks as power supplies. A reliable and safe charging supply for these capacitor banks is desirable and investigated in this paper. Construction and testing of a power supply charger is compared to simulation results. The power supply charger consists of a Voltage Source Inverter (VSI) connected to a high voltage boost transformer; the output of the transformer is connected to a voltage doubler rectifier; the output of the rectifier charges the high voltage capacitor to 9 kV in two minutes. The power supply controller is an FPGA (Field Programmable Gate Array) with embedded control to ensure the safe operation of the power supply.
DTIC
Capacitors; Construction; Design Analysis; High Voltages

20080041437 Department of the Navy, Washington, DC USA
Buoyant Cable Antenna System and Method With Articulating Blocks
Gerhard, Erich M, Inventor; Dec 26, 2006; 26 pp.; In English
Report No.(s): AD-D020371; No Copyright; Avail.: Other Sources

A buoyant cable system and method is provided with a towed platform that is flexible for deployment into the water from a submerged submarine. The towed platform has a memory that returns to a selected shape after deployment. In one embodiment the biasing member is a spring acting against and anchored to Kevlar(trademark) strands running through the blocks such that the blocks are compressed into a desired shape during operation but remain sufficiently flexible for deployment and retrieval. In another embodiment, a keel may be formed from a weighted curved portion that is suitable for vertically supporting an antenna above the surface of the water to prevent signal interference due to water washing over the towed transmission line.
DTIC
Antenna Design; Buoyancy; Transmission Lines

20080041441 Fischman (Steven) , Scully, Scott, Murphy and Presser, Garden City, NY, USA
Method for the Preparation of IV-VI Semiconductor Nanoparticles
Cho, K. S., Inventor; Gaschler, W., Inventor; Murray, C. B., Inventor; Talapin, D., Inventor; 22 Nov 04; 19 pp.; In English
Contract(s)/Grant(s): DAAD19-99-1-0001
Patent Info.: Filed Filed 22 Nov 04; US-Patent-Appl-SN-10-994 944
Report No.(s): PB2008-103836; No Copyright; Avail.: CASI: A03, Hardcopy

A high temperature (on the order of about 90 degrees C. or above) non-aqueous synthetic procedure for the preparation of substantially monodisperse IV-VI semiconductor nanoparticles (quantum dots) is provided. The procedure includes first introducing a first precursor selected from the group consisting of a molecular precursor of a Group IV element and a molecular precursor of a Group VI element into a reaction vessel that comprises at least an organic solvent to form a mixture. Next, the mixture is heated to a temperature of about 90 degrees C. or above and thereafter a second precursor which is different from the first precursor and is selected from the group consisting of a molecular precursor of a Group IV element

and a molecular precursor of a Group VI element is added into the heated mixture. The reaction mixture is then mixed to initiate nucleation of IV-VI nanocrystals and the temperature of the reaction mixture is controlled to provide substantially monodispersed IV-VI nanoparticles having a diameter of about 20 nm or less.
NTIS
Nanoparticles; Patent Applications; Semiconductors (Materials)

20080041447 UT-Battelle, LLC, Oak Ridge, TN, USA
Auxiliary Quasi-Resonant DC Tank Electrical Power Converter
Peng, F. Z., Inventor; 1 Jul 05; 14 pp.; In English
Contract(s)/Grant(s): DE-AC05-00OR22725
Patent Info.: Filed Filed 1 Jul 05; US-Patent-Appl-SN-11-173 341
Report No.(s): PB2008-103829; No Copyright; Avail.: CASI: A03, Hardcopy

An auxiliary quasi-resonant DC tank (AQRDCT) power converter with fast current charging, voltage balancing (or charging), and voltage clamping circuits is provided for achieving soft-switched power conversion. The present invention is an improvement of the invention taught in U.S. Pat. No. 6,111,770, herein incorporated by reference. The present invention provides faster current charging to the resonant inductor, thus minimizing delay time of the pulse width modulation (PWM) due to the soft-switching process. The new AQRDCT converter includes three tank capacitors or power supplies to achieve the faster current charging and minimize the soft-switching time delay. The new AQRDCT converter further includes a voltage balancing circuit to charge and discharge the three tank capacitors so that additional isolated power supplies from the utility line are not needed. A voltage clamping circuit is also included for clamping voltage surge due to the reverse recovery of diodes.
NTIS
Patent Applications; Power Converters

20080041449 Harness, Dickey and Pierce, PLC, Reston, VA, USA
Methods and Devices for Determining the Linearity of Signals
Moch, T. A., Inventor; 19 Nov 04; 16 pp.; In English
Patent Info.: Filed Filed 19 Nov 04; US-Patent-Appl-SN-10-992 085
Report No.(s): PB2008-103827; No Copyright; Avail.: CASI: A03, Hardcopy

The time it takes to determine whether a signal is a linear or non-linear frequency modulated (FM) signal is significantly reduced by continuously updating upper and lower frequency-related bounds (e.g., slopes) used in determining whether a signal is a linear or non-linear FM signal in real-time. The techniques provided by the present invention also require substantially less memory to determine whether a signal is a linear or non-linear FM signal.
NTIS
Linearity; Patent Applications

20080041451 Blakely, Sokoloff, Taylor and Zafman, Los Angeles, CA, USA
Transponder Incorporated into an Electronic Device
Carrender, C., Inventor; 22 Nov 04; 27 pp.; In English
Patent Info.: Filed Filed 22 Nov 04; US-Patent-Appl-SN-10-996 294
Report No.(s): PB2008-103822; No Copyright; Avail.: CASI: A03, Hardcopy

The electronic device comprises a metalization layer and an integrated circuit chip incorporated into the device wherein the integrated circuit chip is capacitively coupled to the metalization layer. The device comprises a first substrate having the metalization layer formed on the substrate, a cap layer covering at least the entire metalization layer and at least a portion of the first substrate not covered by the metalization layer. The integrated circuit chip is coupled to the first substrate, and is placed in proximity and in non-physical contact with the metalization layer. A conductive layer is attached to the integrated circuit chip. The conductive layer has at least a portion placed in a non-physical contact with the metalization layer. The integrated circuit chip is capacitively coupled to the metalization layer through the conductive layer and the metalization layer.
NTIS
Electronic Equipment; Patent Applications; Transponders

20080041612 Pennsylvania State Univ., University Park, PA USA
Improved Thin Film Piezoelectrics for Actuator Applications
Trolier-McKinstry, Susan; Feb 4, 2008; 14 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-07-1-0104
Report No.(s): AD-A483759; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483759

Thin film piezoelectrics for microelectromechanical systems offer large motions, often with low hysteresis, high available energy densities, as well as high sensitivity sensors with wide dynamic ranges, and low power requirements. Among ferroelectric films, the majority of the MEMS sensors and actuators developed have utilized lead zirconate titanate (PZT) films as the transducer. Randomly oriented PZT films show piezoelectric e31 ,f coefficients of about - 6 to 7 C/m2 at the morphotropic phase boundary. It has recently been suggested that these coefficients are suppressed by Zr/Ti compositional gradients within the films. Consequently, the goal of this exploratory program was to prepare PZT films with different levels of compositional uniformity via chemical solution deposition, and quantify the resulting dielectric and piezoelectric constants of the films. Four different solution methods were examined. It was determined that published methods for reducing compositional gradients in PZT films were not straightforward to reproduce. Significantly better piezoelectric coefficients were obtained by using {001} oriented PbTi03 buffer layers to prepare {001} oriented PZT films. The net result is that it was possible to double the e31 ,f coefficient to -12 C/m2. The resulting thin films will enable lower voltage MEMS actuators as well as improved sensor and energy harvesting systems.
DTIC
Actuators; Chemical Reactions; Dielectric Properties; Microelectromechanical Systems; Piezoelectricity; Thin Films

20080041644 National Inst. of Standards and Technology, Boulder, CO USA
Progress on a New GPS Common-View Receiver
Weiss, Marc A; Jan 2001; 6 pp.; In English
Report No.(s): AD-A483842; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483842

We are developing a new GPS common-view time transfer receiver to support both International Atomic Time (TAI) and comparison of frequency standards. Our goal is to realize a time-transfer accuracy of one ns or below, and time-transfer stabilities of 0.5 ns out to 1 year. Having obtained consistent stabilities at 100 ps or below with common-clock experiments out to 1 month with three laboratory prototype systems, we are now building a unit that can be moved among different timing labs. We show studies of three different time-interval counter cards considered for this project, revealing stabilities as a function of temperature and supplied voltage.
DTIC
Global Positioning System; Receivers

20080041660 Army Research Lab., Aberdeen Proving Ground, MD USA
Techniques for Co-Design of Optically-Connected Embedded Multiprocessors
Bambha, Neal; Bhattacharyya, Shuvra; Sep 2002; 3 pp.; In English
Contract(s)/Grant(s): MDA972-00-1-0023
Report No.(s): AD-A483873; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483873

Several trends in technology have important implications for future digital signal processing (DSP) systems. By the year 2010, integrated circuit technology will allow 800 million transistors on a single chip. Already, manufacturers are placing multiple DSP cores on a single chip. Multiprocessor systems will become increasingly important in the future. A significant challenge is to develop software and compiler techniques to effectively exploit multiple processors. Signal and image processing algorithms are among those applications that can benefit from multiprocessor systems. Optics provides unique advantages and opportunities for designers of embedded multiprocessor systems, including the ability to construct highly connected and irregular networks that are streamlined for particular applications. Using these networks, it is possible to implement application mappings that allow flexible, low-hop communication patterns between processors. This has advantages for reduced system latency and power. Such optically connected multiprocessors are particularly promising for embedded DSP applications, which are highly parallel, and typically have tight constraints on latency and power consumption. Several groups have demonstrated optically-connected multiprocessor systems. However, comparatively little work has been done to develop compiler technology and automated mapping tools to take advantage of these systems. This work addresses the co-design of interconnect topologies and application mappings for DSP systems on optically connected multiprocessors.

We demonstrate that existing DSP scheduling algorithms will deadlock for arbitrarily-connected networks, or when communication is restricted to a limited number of hops. We show that these low-hop communication schedules produce low power and low latency mappings.
DTIC
Embedding; Image Processing; Multiprocessing (Computers); Signal Processing

20080041669 Symmetricon, Inc., Santa Rosa, CA USA
Modeling Phase-Locked Loops Using Verilog
Meyer, Jeffrey; Nov 2007; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483891; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483891

An essential component of any mixed signal embedded system is a Phase-Locked Loop (commonly know as PLL). Almost every mixed signal system has one or more PLL in its block diagram. Phase-locked loops are used for a variety of tasks, like multiplying clock frequencies, generating precise clock phases, and generating complex RF modulated signals like phase modulation. Many modern field programmable gate array devices come with integrated PLL to multiply clocks or adjust the phase of clock outputs. Modeling PLLs has always been difficult because they are part analog and part digital. Circuits that are both analog and digital are called 'Analog Mixed Signal' or abbreviated as AMS. In the most basic block diagram of a PLL (Figure 1), the building blocks of the PLL are identified. The voltage-controlled oscillator (or VCO), the charge pump (or loop amplifier), and the loop filter are all analog blocks. The phase detector and dividers are digital blocks. Because the PLL is composed of both analog and digital blocks, it is called mixed signal. The PLL is a feedback loop that adjusts the phase and frequency of the VCO to lock to the phase of the input reference oscillator. When the PLL is locked, the output frequency is a fractional multiple of the input frequency, equation F(out) / N = F(ref) / R or F(out) = F(ref) N / R.
DTIC
Computerized Simulation; Digital Simulation; Feedback; Loops; Mathematical Models; Phase Locked Systems

20080041675 Library of Congress, Washington, DC USA
Nanotechnology: A Policy Primer
Sargent, John F; May 20, 2008; 16 pp.; In English
Report No.(s): AD-A483912; CRS-RL34511; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483912

Nanoscale science, engineering and technology commonly referred to collectively as nanotechnology is believed by many to offer extraordinary economic and societal benefits. Congress has demonstrated continuing support for nanotechnology and has directed its attention primarily to three topics that may affect the realization of this hoped for potential: federal research and development (R&D) in nanotechnology; U.S. competitiveness; and environmental, health, and safety (EHS) concerns. This report provides an overview of these topics which are discussed in more detail in current and upcoming CRS reports and two others: nanomanufacturing and public understanding of and attitudes toward nanotechnology. The development of this emerging field has been fostered by significant and sustained public investments in nanotechnology R&D. Nanotechnology R&D is directed toward the understanding and control of matter at dimensions of roughly 1 to 100 nanometers. At this size, the properties of matter can differ in fundamental and potentially useful ways from the properties of individual atoms and molecules and of bulk matter. Since the launch of the National Nanotechnology Initiative (NNI) in 2000, Congress has appropriated approximately $8.4 billion for nanotechnology R&D. More than 60 nations have established similar programs. In 2006 alone, total global public R&D investments reached an estimated $6.4 billion, complemented by an estimated private sector investment of $6.0 billion. Data on economic outputs that are used to assess competitiveness in mature technologies and industries, such as revenues and market share, are not available for assessing nanotechnology. Alternatively, data on inputs (e.g., R&D expenditures) and non-financial outputs (e.g. scientific papers, patents) may provide insight into the current U.S. position and serve as bellwethers of future competitiveness.
DTIC
Nanotechnology; Policies

20080041681 E-Beam, Inc., Beaverton, OR USA

Miniature High Density Scandate Cathodes for Linear Beam Devices

Vancil, Bernard K; Brodie, Ivor; Carpenter, Arthur; Jul 14, 2008; 31 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-07-C-0146

Report No.(s): AD-A483936; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483936

The work was an investigation of recent promising results by workers in China on scandate impregnated cathodes. The improvement in dispenser cathode performance due to additions of small quantities of scandium oxide has been known since at least the 1980s. But workers in China have produced breakthrough performance with verified current loadings to 100 A/cm2. These results have not been fully reproduced or understood by cathode researchers in this country. Sustained loading of 100 A/cm2 would be about a ten-fold improvement over existing technology. It would enable significant improvements in vacuum microwave, millimeter wave, and terahertz linear beam sources and amplifiers.

DTIC

Cathodes; High Temperature; Miniaturization

20080041682 New York Univ., New York, NY USA

Optical Pulse Interactions in Nonlinear Excited State Materials

Potasek, Mary; McLaughlin, David; Parilov, Evgueni; Jul 14, 2008; 66 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-04-1-0219

Report No.(s): AD-A483940; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483940

We cover five general areas: (1) optical limiting (2) organic multiphoton absorber (AFX) (3) numerical methods (4) relationship between the building blocks/decay rate matrix and the coupled propagation/rate equations and (5) semiconductor quantum dots.

DTIC

Excitation; Nonlinearity; Quantum Dots; Semiconductors (Materials)

20080041684 Northwestern Univ., Evanston, IL USA

III-Nitride Visible- and Solar-Blind Avalanche Photodiodes

Razeghi, Manijeh; Dec 2007; 22 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-07-1-0326

Report No.(s): AD-A483944; 0650-350-S408; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483944

There is a need for single photon detectors for a variety of scientific, military, and civilian applications. Compared to photomultiplier tubes or superconducting single photon detectors, the use of Geiger-mode avalanche photodiodes (APDs) presents advantages such as lower operation voltages, reduced sizes, and reduced need for cooling, which may enable the fabrication of more compact, lower power, and all-solid-state APD/CMOS integrated arrays. APDs based on wide-band-gap semiconductors are of special interest when there is a need for reliable ultraviolet detection with single photon counting capabilities. The tunable response of AlGaN detectors allows for solar- to visible-blind performances within the same material system, without the need of filters. We report on the growth, fabrication, and characterization of back-illuminated GaN APDs on thick AlN templates. Comparison of the performance of these same devices under front and back illumination allows us to reach a better understanding of carrier multiplication in this material and to determine experimentally both electron and hole ionization coefficients. Devices of various mesa sizes were fabricated and the effects of increased area on device performance were studied. Finally, devices were characterized in Geiger mode to evaluate their capabilities for single-photon detection.

DTIC

Avalanche Diodes; Nitrides

20080041829 Silvus Communication Systems, Inc., Los Angeles, CA USA

Eigen Spreading

Zhu, Weijun; Daneshrad, Babak; Feb 27, 2008; 19 pp.; In English

Contract(s)/Grant(s): W31P4Q-05-C-0272; ARPA ORDER-U708-43

Report No.(s): AD-A484192; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In this contract we investigated the potential of using multiple antennas to improve communications in an interference/

jammer intensive environment. The motivation for the work and the deviation from traditional beam forming and beam nulling techniques comes from the recent advances in the field of multi-input multi-output (MIMO) wireless communications which was fueled by the seminal work of Foschini, Gans and Teletar over a decade ago. MIMO techniques have shown tremendous improvement in the throughput and quality of wireless data communication links in commercial and interference limited scenarios, however, their utility to improve interference and jammer immunity has hitherto been unexplored. MIMO techniques augment the traditional 2-dimensional signaling space that consist of time and frequency into a three-dimensional space consisting of time, frequency, and space. The spatial element of the channel is energized via the use of multiple, spatially separate antennas. Commercial systems exploit the third signaling dimension to achieve diversity and/or spatial multiplexing gain, however, we want to see if it is possible to exploit it to achieve improved LPD and AJ immunity.
DTIC
Eigenvalues; Multibeam Antennas; Spreading

20080041853 Virginia Commonwealth Univ., Richmond, VA USA
Self Assembled Semiconductor Quantum Dots for Spin Based All Optical and Electronic Quantum Computing
Bandyopadhyay, Supriyo; Morkoc, Hadis; Baski, Alison; Khanna, Shiv; Apr 17, 2008; 27 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-04-1-0261
Report No.(s): AD-A484254; VCU-529205; PT090241; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This project involved the study of self-assembled quantum dots as hosts for spin based qubits. Both semiconductor quantum dots, nanowires, and organic quantum dots were studied and the spin relaxation times were measured. The organic Alq3 appears to have very long longitudinal spin relaxation time of nearly 1 second at a temperature of 100 K, and a nearly temperature independent transverse relaxation time > 3 nsec in the range 2-300 K. This relaxation time is sufficient to fulfill the Knill criterion for fault-tolerant quantum computing at room temperature. Since organics have special selection rules for radiative transitions whereby triplet electron-hole pairs are dark excitons and only singlets are radiative, there is a natural qubit read out scheme for organic quantum dots. We have also studied inorganic semiconductor quantum dots, but find them inferior to their organic counterparts for spin based quantum computing, primarily because spin-orbit interactions are much stronger in inorganic quantum dots, leading to much faster spin dephasing.
DTIC
Electro-Optics; Optical Computers; Optical Data Processing; Quantum Computation; Quantum Dots; Semiconductors (Materials)

20080041854 University of Southern California, Los Angeles, CA USA
Ensemble Techniques for Determining Globally Optimal Designs for Problems with Broadly Stated Design Objectives
Wang, Chunming; Rosen, Gary I; Apr 27, 2008; 4 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-07-1-0485
Report No.(s): AD-A484255; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In this project we have investigated the use of global optimization techniques for device design problems in photonics and electronics. Using several concrete device design problems as guides, we have defined a sub-class of global optimization problems with high-dimensional design space as the main focus of our effort. We have evaluated optimization approaches including Genetic Algorithm and Simulated Annealing for this class of problems. This evaluation confirmed our previous experience in using these techniques in global optimal design problem. In fact these methods do not effectively use all available local information during the search for the global optimal solution and can easily be trapped near locally optimal solutions. We have subsequently developed an Ensemble Global Optimization (EnGO) technique that explicitly defines region of exclusions around already examined points in the design space to allow maximal coverage of the design space through randomized search. At the same time local gradient information is used to accelerate convergence to local and global optimal solution. The method is being tested successfully on prototype problems in relatively high dimensional design space.
DTIC
Design Analysis; Photonics; Problem Solving

20080041907 Naval Research Lab., Washington, DC USA

Engineered Heterostructures of 6.1 A III-V Semiconductors for Advanced Electronic and Optoelectronic Applications

Shanabrook, B V; Barvosa-Carter, W; Bass, R; Bennett, B R; Boos, J B; Bewley, W W; Bracker, A S; Culbertson, J C; Glaser, E R; Kruppa, W; Jan 1999; 11 pp.; In English; Original contains color illustrations

Report No.(s): AD-A484408; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Heterostructures formed from III-V semiconductors with the 6.1 lattice spacing 'InAs, GaSb, AlSb and related alloys' have attracted significant interest because of their potential to define a new 'state of the art' in applications including 100 GHz high-speed logic circuits, terahertz transistors, sensitive infrared detectors and mid-infrared semiconductor lasers. In this paper, we describe the ongoing work at the Naval Research Laboratory to develop the materials growth and fabrication technology for a variety of 6.1 -based devices that have the potential to revolutionize infrared optoelectronics and low-power high-speed electronics.

DTIC

Electronic Equipment; Electro-Optics; Semiconductors (Materials)

20080041913 Johns Hopkins Univ., Laurel, MD USA

Autonomous Characterization of Clock Drift for Timescale Improvement at the JHU/APL Time and Frequency Laboratory

Miranian, Mihran; Weaver, Gregory L; Reinhart, Matthew J; Aug 2005; 7 pp.; In English; Original contains color illustrations

Report No.(s): AD-A484425; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We have reported on continuous improvements in the capability of our Time and Frequency Laboratory. A substantial portion of our progress in capability was achieved through the incorporation of new clock hardware, improvement in GPS time recovery and coordination of our clocks into the computation of TAI. We have discussed our ensemble of hydrogen maser and cesium beam atomic clocks into a timescale that enables UTC(APL) to be steered within +/- 30 nanoseconds per month of UTC. The propagation of the APL timescale is based on a modified version of the Percival method, requiring regular characterization of each clock's frequency rate and drift. Here, we will discuss our results in an autonomous characterization of the individual clocks contributing to the APL timescale. This improvement in our operation has minimized the need for routine operator timescale maintenance and realizes the advantages in clock estimation using frequency, described by J.A. Barnes and D.W. Allan [1]. We will discuss how our approach at characterizing the nonlinear drift observed in our hydrogen masers has aided our attempt to discipline the long term frequency drift behavior of quartz ultra-stable oscillators in the space environment. As in previous reports, we will present updated laboratory performance in the form of UTC ? UTC(APL).

DTIC

Atomic Clocks; Autonomy; Clocks; Frequencies; Global Positioning System

20080042000 Hsue (Parsons) and De Runtz, LLP, San Francisco, CA, USA

Ultra-Slow Down and Storage of Light Pulses, and Altering of Pulse Spectrum

Yanik, M. F., Inventor; Fan, S., Inventor; 30 Nov 04; 26 pp.; In English

Contract(s)/Grant(s): NSF-0200445

Patent Info.: Filed Filed 30 Nov 04; US-Patent-Appl-SN-11-001 492

Report No.(s): PB2008-102442; No Copyright; Avail.: CASI: A03, Hardcopy

Light pulses can be stopped and stored coherently, with an all-optical process that involves an adiabatic and reversible pulse bandwidth compression occurring entirely in the optical domain. Such a process overcomes the fundamental bandwidth-delay constraint in optics, and can generate arbitrarily small group velocities for light pulses with a given bandwidth, without the use of any coherent or resonant light-matter interactions. This is accomplished only by small refractive index modulations performed at moderate speeds and has applications ranging from quantum communications and computing to coherent all-optical memory devices. A complete time reversal and/or temporal/spectral compression and expansion operation on any electromagnetic field is accomplished using only small refractive index modulations and linear optical elements. This process does not require any nonlinear multi-photon processes such as four-wave mixing and thus can be implemented using on-chip tunable microcavity complexes in photonic crystals. The tuning process requires only small refractive index modulations, and moderate modulation speeds without requiring any high-speed electronic sampling.

NTIS

Bandwidth; Light Sources; Optical Waveguides; Patent Applications; Pulse Compression; Spectra

20080042009 Los Alamos National Lab., NM, USA

Near Single-Crystalline, High-Carrier-Mobility Silicon Thin Film on a Polycrystalline/Amorphous Substrate

Findikoglu, A. T., Inventor; Jia, Q., Inventor; Arendt, P. N., Inventor; Matias, V., Inventor; Choi, W., Inventor; 30 Nov 04; 12 pp.; In English

Contract(s)/Grant(s): W-7405-ENG-36

Patent Info.: Filed Filed 30 Nov 04; US-Patent-Appl-SN-11-001 461

Report No.(s): PB2008-102484; No Copyright; Avail.: CASI: A03, Hardcopy

A template article including a base substrate including: (i) a base material selected from the group consisting of polycrystalline substrates and amorphous substrates, and (ii) at least one layer of a differing material upon the surface of the base material; and, a buffer material layer upon the base substrate, the buffer material layer characterized by: (a) low chemical reactivity with the base substrate, (b) stability at temperatures up to at least about 800.degree. C. under low vacuum conditions, and (c) a lattice crystal structure adapted for subsequent deposition of a semiconductor material; is provided, together with a semiconductor article including a base substrate including: (i) a base material selected from the group consisting of polycrystalline substrates and amorphous substrates, and (ii) at least one layer of a differing material upon the surface of the base material; and, a buffer material layer upon the base substrate, the buffer material layer characterized by: (a) low chemical reactivity with the base substrate, (b) stability at temperatures up to at least about 800.degree. C. under low vacuum conditions, and (c) a lattice crystal structure adapted for subsequent deposition of a semiconductor material, and, a top-layer of semiconductor material upon the buffer material layer.

NTIS

Amorphous Materials; Carrier Mobility; Patent Applications; Polycrystals; Semiconductors (Materials); Silicon Films; Single Crystals; Substrates

20080042019 Steptoe and Johnson, LLP, Washington, DC, USA

Optical Feedback Structures and Methods of Making

Snee, P. T., Inventor; Chan, Y. T., Inventor; Nocera, D. G., Inventor; Bawendi, M. G., Inventor; 29 Nov 05; 27 pp.; In English

Contract(s)/Grant(s): CHE-0209898; DE-FG02-02ER45974

Patent Info.: Filed Filed 29 Nov 05; US-Patent-Appl-SN-11-288 321

Report No.(s): PB2008-102513; No Copyright; Avail.: CASI: A03, Hardcopy

An optical resonator can include an optical feedback structure disposed on a substrate, and a composite including a matrix including a chromophore. The composite disposed on the substrate and in optical communication with the optical feedback structure. The chromophore can be a semiconductor nanocrystal. The resonator can provide laser emission when excited.

NTIS

Feedback; Optical Resonators; Patent Applications

20080042028 Weingarten, Schurgin, Gagnebin and Lebovici. LLP, Boston, MA, USA; Veterans Administration Medical Center, Charleston, SC, USA

Quantum Junction Device as Switch and Detector

Chamon, C., Inventor; Affleck, I., Inventor; Oshikawa, M., Inventor; 15 Nov 04; 8 pp.; In English

Contract(s)/Grant(s): DMR-0203159; DMR-9876208

Patent Info.: Filed Filed 15 Nov 04; US-Patent-Appl-SN-10-988 927

Report No.(s): PB2008-102511; No Copyright; Avail.: CASI: A02, Hardcopy

A quantum junction device having three or more wires connected to a loop surrounding a magnetic flux is used to act as a switch responsive to magnetic flux and therefore useable for mass storage devices or as a flux detector by sensing current direction, conductance tensor, in response to a magnetic field under test.

NTIS

Magnetic Flux; Patent Applications; Switches

20080042061 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA

Wide Bandgap Semiconductor Layers on SOD Structures

Weber, E. R., Inventor; Zimmer, J. W., Inventor; 14 Oct 05; 8 pp.; In English

Contract(s)/Grant(s): DE-AC03-76SF00098; DE-AC02-05CH11231

Patent Info.: Filed Filed 14 Oct 05; US-Patent-Appl-SN-11-250 728

Report No.(s): PB2008-102503; No Copyright; Avail.: CASI: A02, Hardcopy

Multi-layered structures containing GaN on SOD (silicon/diamond/ silicon)substrates are described. The unique substrate/epilayer combination can provide electronic materials suitable for high-power and opto-electronicdevices without commonly observed limitations due to excess heat during device operation. The resulting devices have built-in thermal heat spreading capability that result in better performance and higher reliability.
NTIS
Diamonds; Energy Gaps (Solid State); Gallium Nitrides; Loads (Forces); Patent Applications; Semiconductor Devices; Semiconductors (Materials); Silicon; Substrates

20080042071 Hoag (Foley), LLP, Boston, MA, USA
Nonlinear Pulse Oscillator Methods and Apparatus
Ricketts, D., Inventor; Li, X., Inventor; Ham, D., Inventor; 8 Sep 05; 32 pp.; In English
Contract(s)/Grant(s): ECS-0313143
Patent Info.: Filed Filed 8 Sep 05; US-Patent-Appl-SN-11-222 255
Report No.(s): PB2008-102508; No Copyright; Avail.: CASI: A03, Hardcopy

Methods and apparatus for implementing stable self-starting and self-sustaining electrical nonlinear pulse (e.g., soliton, cnoidal wave, or quasi-soliton) oscillators. In one example, a nonlinear pulse oscillator is implemented as a closed loop structure that comprises a nonlinear transmission line, an improved high-pass filter, and a nonlinear amplifier configured to provide a self-adjusting gain as a function of an average voltage of the oscillator signal, to provide a pulse waveform having a desired target amplitude. In one implementation, the nonlinear amplifier and high pass filter functions are integrated in a two stage nonlinear amplifier/filter apparatus employing complimentary NMOS and PMOS amplification components and associated filtering and feedback circuitry configured to essentially implement an electric circuit analog of a saturable absorber via an adaptive bias control technique.
NTIS
Nonlinearity; Oscillators; Patent Applications

20080042077 National Center for Defense Manufacturing and Machining, Latrobe, PA USA
Night Vision Goggle Plate 'Machine vs. Cast' Study
McCullough, Lee; Dec 22, 2006; 12 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-NP06012111
Report No.(s): AD-A483746; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The National Center for Defense Manufacturing and Machining (NCDMM) was requested to assist Letterkenny Army Depot (LEAD) in performing a 'Machine vs. Cast' study for the A3297308-1 plate (bracket), part of the A3297308 Front Bracket Assembly used on the ACH/CVC helmet Night Vision Goggle (NVG) kit, A3297037. LEAD has the capability to manufacture the plate using their existing equipment; however, there are several options that should be evaluated when selecting the best overall path considering part cost, capital requirements, shop capacity and volume of future orders.
DTIC
Cost Analysis; Cost Effectiveness; Goggles; Night Vision; Production Engineering

20080042113 Army Communications-Electronics Command, Fort Monmouth, NJ USA
Aging of Dual Mode Resonator for Microcomputer Compensated Crystal Oscillator
Kim, Yoonkee; Aug 2005; 6 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484423; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A Microcomputer Compensated Crystal Oscillator (MCXO) utilizes the dual c-mode excitation (fundamental mode and 3rd overtone (OT)) of an SC-cut resonator for self-temperature sensing and compensation. The long-term stability of the MCXO depends primarily on the aging of the dual mode resonator. When two modes age differently in time, the aging MCXO's output frequency curve would shift with a tilt over its operating temperature range. In this paper, we report the aging of the dual modes of the 20 MHz 3rd OT SC-cut MCXO resonators. The resonators were measured over the ?55 deg C ~ +85 deg C temperature range with the self-temperature sensing technique utilized for the MCXO. The measured aging of the two modes ranges from 0.083 ppb to 0.386 ppb per day. The fundamental mode shows more aging than the OT. Observing the different aging of the two modes is not surprising since the mode shape effect and stress relief would be different between the two modes. The different aging rates exacerbate the long-term aging in the MCXO by increasing the offset more than the worse aging rate of the two.
DTIC
Crystal Oscillators; Microcomputers; Resonators

20080042125 Hsue (Parsons) and De Runtz, LLP, San Francisco, CA, USA

Stopping and Time Reversing Light in a Waveguide with an All-Optical System

Yanik, M. F., Inventor; Suh, W., Inventor; Wang, W., Inventor; Fan, S., Inventor; 30 Nov 04; 9 pp.; In English

Contract(s)/Grant(s): NSF-NRAC; ECS-0200445

Patent Info.: Filed Filed 30 Nov 04; US-Patent-Appl-SN-11-000 679

Report No.(s): PB2008-102441; No Copyright; Avail.: CASI: A02, Hardcopy

We introduce a new all-optical mechanism that can compress the bandwidth of light pulses to absolute zero, and bring them to a complete stop. The mechanism can be realized in a system consisting of a waveguide side-coupled to tunable resonators, which generates a photonic band structure that represents a classical analogue of the Electromagnetically Induced Transparency. The same system can also achieve a time-reversal operation. We demonstrate the operation of such a system by finite-difference time-domain simulations of an implementation in photonic crystals.

NTIS

Crystals; Light Sources; Optical Waveguides; Patent Applications; Reversing; Stopping; Waveguides

20080042127 Rosenberg (Frank), Moraga, CA, USA

Microsystem Process Networks (PAT-APPL-11-241 580)

Wegeng, R. S., Inventor; TeGrotenhuis, W. E., Inventor; Whyatt, G. A., Inventor; 30 Sep 05; 44 pp.; In English

Contract(s)/Grant(s): DE-AC067RLO1830

Patent Info.: Filed Filed 30 Sep 05; US-Patent-Appl-SN-11-241 580

Report No.(s): PB2008-102443; No Copyright; Avail.: CASI: A03, Hardcopy

Various aspects and applications of microsystem process networks are described. The design of many types of microsystems can be improved by ortho-cascading mass, heat, or other unit process operations. Microsystems having exergetically efficient microchannel heat exchangers are also described. Detailed descriptions of numerous design features in microcomponent systems are also provided.

NTIS

Fuel Cells; Microelectronics; Patent Applications

20080042145 Procter (Goodwin), New York, NY, USA

Surface Passivation for III-V Compound Semiconductors

Salzman, D. B., Inventor; Yulius, A., Inventor; Chen, A., Inventor; Woodall, J. M., Inventor; Harmon, E., Inventor; 30 Dec 05; 24 pp.; In English

Contract(s)/Grant(s): W31P4Q-04-C-R309

Patent Info.: Filed Filed 30 Dec 05; US-Patent-Appl-SN-11-323 882

Report No.(s): PB2008-104531; No Copyright; Avail.: CASI: A03, Hardcopy

A structure and method of fabrication are disclosed for improving surface passivation of III-V compound semiconductors. The invention exploits certain anion-rich compound semiconductors to form a high quality interface with a dielectric when anion mobility is increased during an annealing step. Low post-annealing surface state densities result in a low fixed charge density at the interface and low surface recombination velocities. The invention enables microelectronic devices including diode, transistor, solar cell, photodetector, and CCDs with superior performance wherever prior art devices have inferior surface passivation.

NTIS

Passivity; Patent Applications; Semiconductors (Materials)

20080042150 Kinney and Lange, PA, Minneapolis, MN, USA; North Dakota State Univ., ND, USA

Calibration Method and Apparatus for Potentiostats

Bonitz, V. S., Inventor; Hinderliter, B. R., Inventor; Bierwagen, G. P., Inventor; 18 Nov 05; 11 pp.; In English

Contract(s)/Grant(s): F49620-02-1-0398

Patent Info.: Filed Filed 18 Nov 05; US-Patent-Appl-SN-11-283 524

Report No.(s): PB2008-104521; No Copyright; Avail.: CASI: A03, Hardcopy

A system and method for potentiostat calibration includes a conductive substrate, a model film placed on the substrate, an electrolyte, and a potentionstat for obtaining calibration data from tests conducted on the model film. The electrolyte is disposed at a first side of the model film opposite the substrate, and in electrical contact with the model film. The potentiostat

includes a working electrode, a reference electrode, and a counter electrode. The working electrode is electrically connected to the substrate, and the reference and counter electrodes are positioned at the electrolyte.
NTIS
Calibrating; Controllers; Electric Potential; Patent Applications

20080042295 Britt (Trask), Salt Lake City, UT, USA
Mold for Forming Spacer for Flat Panel Displays
Hofmann, J. J., Inventor; Vaartstra, B. A., Inventor; Kraus, B. D., Inventor; Westmoreland, D. L., Inventor; 17 Feb 06; 31 pp.; In English
Contract(s)/Grant(s): DABT63-97-C-0001
Patent Info.: Filed Filed 17 Feb 06; US-Patent-Appl-SN-11-356 907
Report No.(s): PB2008-103922; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention describes thick film photolithographic molds, methods of making thick film photolithographic molds, and methods of using thick film photolithographic molds to form spacers on a substrate. The thick film photolithographic molds preferably comprise an epoxy bisphenol A novolac resin. The present invention also describes sol gel spacers comprising sodium silicates and potassium silicates. The thick film photolithographic molds and sol gel spacers of the present invention can be used in flat panel displays, such as field emission displays and plasma displays.
NTIS
Flat Panel Displays; Patent Applications; Spacers

20080042312 Kenyon and Kenyon, New York, NY, USA
Organic Photosensitive Optoelectronic Device Having a Phenanthroline Exciton Blocking Layer
Thompson, M. E., Inventor; Li, J., Inventor; Forrest, S., Inventor; Rand, B., Inventor; 22 Nov 05; 34 pp.; In English
Contract(s)/Grant(s): 339-6002; 341-4141
Patent Info.: Filed Filed 22 Nov 05; US-Patent-Appl-SN-11-286 228
Report No.(s): PB2008-103919; No Copyright; Avail.: CASI: A03, Hardcopy

An organic photosensitive optoelectronic device, having an anode, a cathode, and an organic blocking layer between the anode and the cathode is described, wherein the blocking layer comprises a phenanthroline derivative, and at least partially blocks at least one of excitons, electrons, and holes.
NTIS
Blocking; Electro-Optics; Excitons; Optoelectronic Devices; Patent Applications

20080042313 Shook, Hardy and Bacon, LLP, Kansas City, MO, USA
Heteroisomer Boron Carbide Devices
Brand, J. I., Inventor; Caruso, A. N., Inventor; Dowhen, P. A., Inventor; 2 Aug 05; 11 pp.; In English
Contract(s)/Grant(s): EPS-9901900; NSF CHE-0346501
Patent Info.: Filed Filed 2 Aug 05; US-Patent-Appl-SN-11-195 408
Report No.(s): PB2008-103918; No Copyright; Avail.: CASI: A03, Hardcopy

Semiconductor devices formed using boron carbide heteroisomer junctions or interfaces are provided. The boron carbide heteroisomer junction devices can be incorporated into diodes and transistors.
NTIS
Boron; Boron Carbides; Patent Applications; Semiconductor Devices

20080042314 Hitt Gaines, PC, Richardson, TX, USA; Lucent Technologies, Murray Hill, NJ, USA
OFET Structures with Both N- and P-Type Channels
Bao, Z., Inventor; Borkent, E. J., Inventor; Li, D., Inventor; 12 Jan 06; 19 pp.; In English
Contract(s)/Grant(s): 70NANB2H3032
Patent Info.: Filed Filed 12 Jan 06; US-Patent-Appl-SN-11-330 472
Report No.(s): PB2008-103917; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention provides a dual organic field-effect transistor (OFET) structure and a method of fabricating the structure. The dual OFET structure includes an n-type organic semiconductor layer and a p-type organic semiconductor layer in contact with each other along an interface and forming a stack. The dual OFET structure also includes a source electrode and a drain electrode, the source and drain electrodes being in contact with one of the organic semiconductor layers. The dual

OFET structure further includes first and second gate structures located on opposite sides of the stack. The first gate structure is configured to control a channel region of the n-type organic semiconductor layer, and the second gate structure is configured to control a channel region of the p-type organic semiconductor layer.
NTIS
Field Effect Transistors; N-Type Semiconductors; Patent Applications; P-Type Semiconductors

20080042322 Foley and Lardner, LLP, Madison, WI, USA
Fabrication of Strained Heterojunction Structures
Savage, D. E., Inventor; Roberts, M. M., Inventor; Lagally, M. G., Inventor; 16 Dec 04; 16 pp.; In English
Contract(s)/Grant(s): NSF-0079983
Patent Info.: Filed Filed 16 Dec 04; US-Patent-Appl-SN-11-014 574
Report No.(s): PB2008-104313; No Copyright; Avail.: CASI: A03, Hardcopy

Growth of multilayer films is carried out in a manner which allows close control of the strain in the grown layers and complete release of the grown films to allow mounting of the released multilayer structures on selected substrates. A layer of material, such as silicon-germanium, is grown onto a template layer, such as silicon, of a substrate having a sacrificial layer on which the template layer is formed. The grown layer has a lattice mismatch with the template layer so that it is strained as deposited. A top layer of crystalline material, such as silicon, is grown on the alloy layer to form a multilayer structure with the grown layer and the template layer. The sacrificial layer is preferentially etched away to release the multilayer structure from the sacrificial layer, relaxing the grown layer and straining the crystalline layers interfaced with it.
NTIS
Fabrication; Heterojunctions; Patent Applications; Semiconductors (Materials)

20080042325 Hewlett-Packard Co., Fort Collins, CO, USA
Method and System for Reading the Resistance State of Junctions in Crossbar Memory
Straznicky, J., Inventor; 13 Dec 04; 16 pp.; In English
Contract(s)/Grant(s): MDA-972-01-3-005
Patent Info.: Filed Filed 13 Dec 04; US-Patent-Appl-SN-11-010 597
Report No.(s): PB2008-104302; No Copyright; Avail.: CASI: A03, Hardcopy

Various embodiments of the present invention are directed to methods for determining the resistance state of nanowire-crossbar junctions, and can also be used to determine the resistance state of sub-microscale crossbar junctions. A pair of wires interconnected through the crossbar junction is biased to determine a first signal for the crossbar junction. The pair of wires interconnected through the crossbar junction is then biased again to increase the resistance of the crossbar junction. The pair of wires interconnected through the crossbar junction is then biased again to determine a second signal for the crossbar junction. The first signal is compared to the second signal to determine the resistance state of the crossbar junction.
NTIS
Nanowires; Patent Applications; Reading

20080042332 Bolt, Beranek, and Newman, Inc., Cambridge, MA, USA
A Model of the THUNDER Actuator
Curtis, Alan R. D.; December 31, 1997; 26 pp.; In English; Original contains black and white illustrations
Contract(s)/Grant(s): NAS1-20101; WBS 129985.05.07.98.42.02
Report No.(s): BBN Tech. Memo. No. 1190; Task No. 17; Copyright; Avail.: CASI: A03, Hardcopy

A THUNDER actuator is a composite of three thin layers, a metal base, a piezoelectric wafer and a metal top cover, bonded together under pressure and at high temperature with the LaRC SI polyimid adhesive. When a voltage is applied between the metal layers across the PZT the actuator will bend and can generate a force. This document develops and describes an analytical model the transduction properties of THUNDER actuators. The model development is divided into three sections. First, a static model is described that relates internal stresses and strains and external displacements to the thermal pre-stress and applied voltage. Second, a dynamic energy based model is described that allows calculation of the resonance frequencies, developed force and electrical input impedance. Finally, a fully coupled electro-mechanical transducer model is described. The model development proceeds by assuming that both the thermal pre-stress and the piezoelectric actuation cause the actuator to deform in a pure bend in a single plane. It is useful to think of this as a two step process, the actuator is held flat, differential stresses induce a bending moment, the actuator is released and it bends. The thermal pre-stress is caused by the different

amounts that the constituent layers shrink due to their different coefficients of thermal expansion. The adhesive between layers sets at a high temperature and as the actuator cools, the metal layers shrink more than the PZT. The PZT layer is put into compression while the metal layers are in tension. The piezoelectric actuation has a similar effect. An applied voltage causes the PZT layer to strain, which in turn strains the two metal layers. If the PZT layer expands it will put the metal layers into tension and PZT layer into compression. In both cases, if shear force effects are neglected, the actuator assembly will experience a uniform in-plane strain. As the materials each have a different elastic modulus, different stresses will develop in each layer and these stresses will induce a bending moment. When the actuator is released from its flat configuration, the differential stresses are relieved as the actuator bends.
Author
Actuators; Electromechanical Devices; Residual Stress; High Temperature; Electrical Impedance; Electric Potential; Bending Moments

20080042339 National Inst. of Standards and Technology, Gaithersburg, MD, USA
I. Temperature Scales, Uncertainty, and Traceability. II. Thermocouples and Thermocouple Wires
Ripple, D.; Sep. 2000; 46 pp.; In English
Report No.(s): PB2008-104272; No Copyright; Avail.: National Technical Information Service (NTIS)
Outline: Temperature Scales; Overview of thermocouples (TCs) and reference functions; Traceability; Thermocouple construction types; Laws of thermocouple circuits; Electrical characteristics, differential thermocouples, extension wires, and feedthroughs; Limitations on thermocouple performance; Calibration uncertainties and methods; Calibration of used thermocouples; Resources.
NTIS
Conferences; Temperature Scales; Thermocouples; Wire

20080042342 National Inst. of Standards and Technology, Gaithersburg, MD USA
Variations in the Thermoelectric Behavior of Palladium Following Heat Treatment
Burns, G. W.; Ripple, D. C.; January 2001; 6 pp.; In English
Report No.(s): PB2008-104263; No Copyright; Avail.: CASI: A02, Hardcopy
In order to identify limitations on the use of Pt/Pd thermocouples as high-accuracy thermometers, we have studied the change in thermocouple emf at the Al and Ag freezing points following a series of heat treatments at various temperatures for several lots of Pd wire. Reversible changes in the thermocouple emf at the Ag point (962 DGC) occur after heat treatments in the approximate temperature range 550 DGC to 1000 DGC, and slower, irreversible changes in emf occur after exposure to higher temperatures. Surprisingly, the sign of the reversible change was different for thermocouples fabricated from two lots of Pd of different purity. The magnitude of the changes in emf can be as high as the equivalent of 0.7 K per 200 h of heat treatment for the irreversible changes and 0.07 K per 200 h for the reversible changes. The consequences of these effects for metrology applications of Pt/Pd thermocouples are discussed.
NTIS
Heat Treatment; Palladium; Thermoelectricity

20080042343 National Inst. of Standards and Technology, Gaithersburg, MD, USA
New Reference Functions for Platinum-10% Rhodium versus Platinum (Type S) Thermocouples Based on the ITS-90. Part II. Results and Discussion
Burns, G. W.; Strouse, G. F.; Mangum, B. W.; Croarkin, M. C.; Guthrie, W. F.; January 2007; 7 pp.; In English
Report No.(s): PB2008-104262; No Copyright; Avail.: CASI: A02, Hardcopy
The Comite Consultatif de Thermometrie requested its Working Group 2 to collaborate with national laboratories in the production of new reference tables and functions for thermocouples based on the International Temperature Scale of 1990 (ITS-90). Pursuant to this recommendation, eight national laboratories have obtained new data on type S thermocouples obtained from several sources. The thermoelectric voltages of those thermocouples have been measured as a function of t90 in the range -50 degrees C to 1070 degrees C, with temperatures obtained from standard platinum resistance thermometers that were calibrated in accordance with the ITS-90 to 962 degrees C, and extrapolated to 1070 degrees C. Also in the range from 710 degrees C to 1065 degrees C, temperatures were measured with a radiation thermometer. In addition, the thermoelectric voltages of the thermocouples have been determined at various thermometric fixed points. From the results of these

measurements, polynomials giving the thermoelectric voltage as a function of t90 have been developed, and new estimates for the temperature differences between the ITS-90 and the IPTS-68 in the range 630 degrees C to 1064 degrees C have been derived.
NTIS
Platinum; Rhodium; Temperature Scales; Thermocouples; Thermometers

20080042344 National Inst. of Standards and Technology, Gaithersburg, MD, USA
New Reference Functions for Platinum-10% Rhodium versus Platinum (Type S) Thermocouples Based on the ITS-90. Part I. Experimental Procedures
Burns, G. W.; Strouse, G. F.; Mangum, B. W.; Croarkin, M. C.; Guthrie, W. F.; January 2007; 4 pp.; In English
Report No.(s): PB2008-104261; No Copyright; Avail.: CASI: A01, Hardcopy

The Comite Consultatif de Thermometrie requested its Working Group 2 to collaborate with national laboratories in the production of new reference tables and functions for thermocouples based on the International Temperature Scale of 1990 (ITS-90). Pursuant to this recommendation, eight national laboratories have obtained new data on type S thermocouples obtained from several sources. The thermoelectric voltages of those thermocouples have been measured as a function of t90 in the range -50 degrees C to 1070 degrees C, with temperatures obtained from standard platinum resistance thermometers that were calibrated in accordance with the ITS-90 to 962 degrees C, and extrapolated to 1070 degrees C. Also in the range from 710 degrees C to 1065 degrees C, temperatures were measured with a radiation thermometer. In addition, the thermoelectric voltages of the thermocouples have been determined at various thermometric fixed points. The experimental procedures, apparatuses, and materials used for the measurements are described in this part.
NTIS
Platinum; Rhodium; Temperature Scales; Thermocouples; Thermometers

20080042345 National Inst. of Standards and Technology, Gaithersburg, MD, USA
New Reference Functions for Platinum-13% Rhodium versus Platinum (Type R) and Platinum-30% Rhodium versus Planinum-6% Rhodium (Type B) Thermocouples Based on the ITS-90
Burns, G. W.; Strouse, G. F.; Mangum, B. W.; Croarkin, M. C.; Guthrie, W. F.; January 2007; 6 pp.; In English
Report No.(s): PB2008-104260; No Copyright; Avail.: CASI: A02, Hardcopy

The Comite Consultatif de Thermometrie requested its Working Group 2 to collaborate with national laboratories in the production of new reference tables and functions for thermocouples based on the International Temperature Scale of 1990 (ITS-90). Pursuant to this recommendation, NPL and NIST have obtained data on type B and type R thermocouples relative to the ITS-90. Thermocouples obtained from several sources have been compared in the range -50 degrees C to 1070 degrees C against platinum resistance thermometers that were calibrated in accordance with the ITS-90 to 962 degrees C, with an extrapolation to 1070 degrees C. The thermoelectric voltages of the thermocouples were also determined at the freezing points of indium, tin, cadmium, zinc, aluminum, silver and gold. From the results of these measurements, polynomials giving the thermoelectric voltages as a function of t90 have been developed for type R thermocouples. Results for type B thermocouples will be addressed.
NTIS
Calibrating; Platinum; Rhodium; Temperature Scales; Thermocouples; Thermometers

20080042350 McGinn Intellectual Property Law Group, PLLC, Vienna, VA, USA
High Speed Photodiode with a Barrier Layer for Blocking or Eliminating Slow Photonic Carriers and Method for Forming Same
Cohen, G. M., Inventor; Ouyang, Q. C., Inventor; Schaub, J. D., Inventor; 11 Jan 06; 20 pp.; In English
Contract(s)/Grant(s): NIST-70NANB8H4018
Patent Info.: Filed Filed 11 Jan 06; US-Patent-Appl-SN-11-329 185
Report No.(s): PB2008-104015; No Copyright; Avail.: CASI: A03, Hardcopy

A structure (and method for forming the structure) includes a photodetector, a substrate formed under the photodetector, and a barrier layer formed over the substrate. The buried barrier layer preferably includes a single or dual p-n junction, or a bubble layer for blocking or eliminating the slow photon-generated carriers in the region where the drift field is low.
NTIS
Barrier Layers; Blocking; High Speed; Patent Applications; Photodiodes; Photons

20080042353 National Renewable Energy Lab., Golden, CO USA
Thin-Film CIGS and CdTe Photovoltaic Technologies: Commercialization, Critical Issues and Applications
Ullal, H. S.; von Roedern, B.; Sep. 2007; 7 pp.; In English
Contract(s)/Grant(s): DE-AC36-99-GO10337
Report No.(s): DE2007-917207; NREL/CP-520-42058; No Copyright; Avail.: National Technical Information Service (NTIS)

We report here on the major commercialization aspects of thin-film photovoltaic (PV) technologies based on CIGS and CdTe (a-Si and thin-Si are also reported for completeness on the status of thin-film PV). Worldwide silicon (Si) based PV technologies continues to dominate at more than 94% of the market share, with the share of thin-film PV at less than 6%. However, the market share for thin-film PV in the USA continues to grow rapidly over the past several years and in CY 2006, they had a substantial contribution of about 44%, compared to less than 10% in CY 2003. In CY 2007, thin-film PV market share is expected to surpass that of Si technology in the USA. Worldwide estimated projections for CY 2010 are that thin-film PV production capacity will be more than 3700 MW. A 40-MW thin-film CdTe solar field is currently being installed in Saxony, Germany, and will be completed in early CY 2009. The total project cost is Euro 130 million, which equates to an installed PV system price of Euro 3.25/-watt averaged over the entire solar project. This is the lowest price for any installed PV system in the world today. Critical research, development, and technology issues for thin-film CIGS and CdTe are also elucidated in this paper.
NTIS
Cadmium Tellurides; Commercialization; Energy Conversion; Photovoltaic Cells; Solar Cells; Thin Films

20080042359 Myers Bigel Sibley and Sajovec, Raleigh, NC, USA
Field Effect Transistors (FETS) Having Multi-Watt Output Power at Millimeter-Wave Frequencies
Parikh, P., Inventor; Wu, Y., Inventor; Saxler, A. W., Inventor; 6 Dec 04; 16 pp.; In English
Contract(s)/Grant(s): N00014-03-C-0092
Patent Info.: Filed Filed 6 Dec 04; US-Patent-Appl-SN-11-005 423
Report No.(s): PB2008-103981; No Copyright; Avail.: CASI: A03, Hardcopy

High electron mobility transistors (HEMT) are provided having an output power of greater than 3.0 Watts when operated at a frequency of at least 30 GHz. The HEMT has a power added efficiency (PAE) of at least about 20 percent and/or a gain of at least about 7.5 dB. The total width of the HEMT is less than about 6.0 mm.
NTIS
Field Effect Transistors; Millimeter Waves; Patent Applications

20080042363 Blakely Sokoloff Taylor and Zafman, Los Angeles, CA, USA
Radio Frequency Idenfication Static Discharge Protection
Herrmann, S. J., Inventor; Hadley, M. A., Inventor; Wiggins, G. S., Inventor; Hattick, J. B., Inventor; 23 Nov 04; 23 pp.; In English
Contract(s)/Grant(s): SB004-03
Patent Info.: Filed Filed 23 Nov 04; US-Patent-Appl-SN-10-997 608
Report No.(s): PB2008-103576; No Copyright; Avail.: CASI: A03, Hardcopy

Methods and apparatuses for the protection of radio frequency identification (RFID) devices are described. In one aspect, a static dissipative material is applied to a web of antenna structures. A coating of the static dissipative material is applied continuously across a plurality of antenna structures of a roll of the web material. An RFID integrated circuit (IC) is attached to the web of antenna structures with the dissipative coating, then subsequently tested on the roll. Additional processing is performed to the RFID tag to produce an RFID label.
NTIS
Patent Applications; Protection; Radio Frequencies; Radio Frequency Discharge

20080042375 Lucent Technologies, Murray Hill, NJ, USA
P-Type OFET With Fluorinated Channels (PAT-APPL-11-337 897)
Bao, Z., Inventor; Borkent, E. J., Inventor; 23 Jan 06; 12 pp.; In English
Contract(s)/Grant(s): NIST-112688000
Patent Info.: Filed Filed 23 Jan 06; US-Patent-Appl-SN-11-337 897
Report No.(s): PB2008-104585; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention provides an organic field-effect transistor (OFET) and a method of fabricating the OFET. The OFET, configured to function as a p-type semiconductor, includes a substrate having a top surface and a semiconductor layer located over the top surface. The semiconductor layer comprises organic semiconductor molecules. Each of the organic semiconductor molecules includes a core having conjugated pi bonds, a fluorinated alkyl group, and an alkyl spacer group having a chain of two or more carbon atoms. One end of the chain is bonded to the fluorinated alkyl group and another end of the chain is bonded to the core. Substituents coupled to the carbon atoms have an electronegativity of less than about 4.
NTIS
Field Effect Transistors; P-Type Semiconductors; Semiconductors (Materials); Organic Semiconductors; Fluorination

20080042376 Yoder (Fletcher), Houston, TX, USA
Vertical Interconnect for Organic Electronic Devices
Liu, J., Inventor; Duggal, A. R., Inventor; Heller, C. M. A., Inventor; Foust, D. F., Inventor; Faircloth, T. J., Inventor; 22 Dec 04; 17 pp.; In English
Contract(s)/Grant(s): NIST-70NANB3H3030
Patent Info.: Filed Filed 22 Dec 04; US-Patent-Appl-SN-11-020 338
Report No.(s): PB2008-104583; No Copyright; Avail.: CASI: A03, Hardcopy

A device includes a plurality of organic electronic devices disposed on a substrate, wherein each of the organic electronic devices comprises a first electrode and a second electrode. Furthermore, the device includes an organic layer disposed between the first and second electrodes of each of the plurality of organic electronic devices. Additionally, the device includes an interconnect element, wherein the interconnect element is configured to electrically couple the respective first and second electrodes of each of the plurality of organic electronic devices.
NTIS
Patent Applications; Electronic Equipment; Devices

20080042377 Honeywell International, Inc., Morristown, NJ, USA
Pulse-Rejecting Circuit for Suppressing Single-Event Transients
Carlson, R. M., Inventor; 6 Dec 04; 18 pp.; In English
Contract(s)/Grant(s): DTRA-01-02-D-0008
Patent Info.: Filed Filed 6 Dec 04; US-Patent-Appl-SN-11-005 265
Report No.(s): PB2008-103986; No Copyright; Avail.: CASI: A03, Hardcopy

A circuit for rejecting single-event transients (SETs) from logic signals is provided. The circuit includes a delay circuit, an inverter circuit, and an output-holding circuit. The delay circuit receives an input signal and delays the input signal to produce a time-delayed version of the input signal. The input signal and the time-delayed version of the input signal are fed into the inverter circuit that propagates a corresponding output signal only when the input signal and the time-delayed version of the input signal have the same logic level. If the input signal or the time-delayed version of the input signal transitions such that both input signals presented to the inverter circuit have opposite logic levels, the output-holding circuit maintains the output signal in its previous state.
NTIS
Circuits; Rejection; Surges; Circuit Protection

20080042411 NASA Langley Research Center, Hampton, VA, USA
New Basis Functions for the Electromagnetic Solution of Arbitrarily-shaped, Three Dimensional Conducting Bodies using Method of Moments
Mackenzie, Anne I.; Baginski, Michael E.; Rao, Sadasiva M.; [2008]; 13 pp.; In English; Original contains black and white illustrations
Contract(s)/Grant(s): WBS 561581.02.10.07.04; Copyright; Avail.: CASI: A03, Hardcopy

In this work, we present a new set of basis functions, defined over a pair of planar triangular patches, for the solution of electromagnetic scattering and radiation problems associated with arbitrarily-shaped surfaces using the method of moments solution procedure. The basis functions are constant over the function subdomain and resemble pulse functions for one and two dimensional problems. Further, another set of basis functions, point-wise orthogonal to the first set, is also defined over the same function space. The primary objective of developing these basis functions is to utilize them for the electromagnetic

solution involving conducting, dielectric, and composite bodies. However, in the present work, only the conducting body solution is presented and compared with other data.
Author
Numerical Analysis; Method of Moments; Electromagnetic Scattering; Three Dimensional Bodies; Dielectrics

20080042412 NASA Langley Research Center, Hampton, VA, USA
An Alternate Set of Basis Functions for the Electromagnetic Solution of Arbitrarily-Shaped, Three-Dimensional, Closed, Conducting Bodies Using Method of Moments
Mackenzie, Anne I.; Baginski, Michael E.; Rao, Sadasiva M.; [2008]; 13 pp.; In English; Original contains black and white illustrations
Contract(s)/Grant(s): WBS 561581.02.10.07.04; Copyright; Avail.: CASI: A03, Hardcopy

In this work, we present an alternate set of basis functions, each defined over a pair of planar triangular patches, for the method of moments solution of electromagnetic scattering and radiation problems associated with arbitrarily-shaped, closed, conducting surfaces. The present basis functions are point-wise orthogonal to the pulse basis functions previously defined. The prime motivation to develop the present set of basis functions is to utilize them for the electromagnetic solution of dielectric bodies using a surface integral equation formulation which involves both electric and magnetic cur- rents. However, in the present work, only the conducting body solution is presented and compared with other data.
Author
Dielectrics; Electromagnetic Scattering; Radiation; Numerical Analysis; Method of Moments; Three Dimensional Bodies

20080042419 Schwegman, Lundberg, Woessner and Kluth, Minneapolis, Macau
Particle Detector with Waveguide Light Confinement
Schmidt, B., Inventor; Lipson, M., Inventor; Rosa de Almeida, V., Inventor; 15 Nov 05; 9 pp.; In English
Contract(s)/Grant(s): ECS-9731293
Patent Info.: Filed Filed 15 Nov 05; US-Patent-Appl-SN-11-274 938
Report No.(s): PB2008-104137; No Copyright; Avail.: CASI: A02, Hardcopy

A strong light confining nano-cavity in a photonic structure enhances the effective extinction cross-section of metal nano-particles. As a result of strong light confinement, precisely where the particle is located, the presence of a single metal nano-particle with a diameter as small, or smaller than 10 nm may be detected by measuring the decrease in transmission of light propagating through the photonic structure. In one embodiment, gold particles may be used as a sensing probe due to their large extinction coefficient in a wavelength range of (1450-1600 nm) and their mature use as labels in biosensing systems. The nanoparticles may be specifically bound to various analytes such as DNA, RNA, proteins and antigens.
NTIS
Confinement; Patent Applications; Radiation Counters; Waveguides

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FLUID MECHANICS AND THERMODYNAMICS

Includes fluid dynamics and kinematics and all forms of heat transfer; boundary layer flow; hydrodynamics; hydraulics; fluidics; mass transfer and ablation cooling. For related information see also *02 Aerodynamics*.

20080040921 Michaleson and Associates, Red Bank, NJ, USA; Sandia Corp., Livermore, CA, USA
Microfluidic Weaklink Device (PAT-APPL-11-021 281)
Shepodd, T. J., Inventor; Duncan, M. P., Inventor; 23 Dec 04; 9 pp.; In English
Contract(s)/Grant(s): DE-AC04-94AL85000
Patent Info.: Filed Filed 23 Dec 04; US-Patent-Appl-SN-11-021 281
Report No.(s): PB2008-103912; No Copyright; Avail.: CASI: A02, Hardcopy

The present invention relates to an electrokinetic (EK) pump capable of creating high pressures electroosmotically, and capable of retaining high pressures. Both pressure creation and retention are accomplished without the need for moving parts. The EK pump uses a polymerizable fluid that creates the pressure-retaining seal within the EK pump when polymerization is initiated, typically by exposure to uv radiation. Weaklink devices are advantageously constructed including such a

pressure-retaining EK pump since, among other advantages, the response of the weaklink device relies on predictable and reliable chemical polymerization reactions.
NTIS
Fluidics; Microfluidic Devices; Patent Applications

20080041042 Ohio Dept. of Health, Columbus. Health Assessment Section, Columbus, OH, USA
Health Consultation: Former Chevron Refinery (Soil Vapor Intrusion in Hooven, Ohio), Hooven, Hamilton County, Ohio. EPA Facility ID: OHD004254132
Nov. 27, 2006; 38 pp.; In English
Report No.(s): PB2008-104052; No Copyright; Avail.: National Technical Information Service (NTIS)

In May of 2004, in response to the concerns voiced by the Hamilton County Health Commissioner and area residents, the Health Assessment Section (HAS) at the Ohio Department of Health produced a Health Consultation for the Chevron Cincinnati Facility in Hooven, Ohio. Since that Health Consultation was published, Chevron has investigated the concentrations of petroleum hydrocarbons in soil gas under the village of Hooven, in sub-slab and near-slab samples adjacent to residences, and from the nested subsurface vapor wells. The results of this sampling were reported in the Subsurface Investigation Field Activities Report and Human Health Risk Assessment, Chevron Cincinnati Facility, Hooven, Ohio, released in October, 2005. The Hamilton County General Health District asked HAS to update the 2004 Health Consultation with the new data from this report.
NTIS
Health; Intrusion; Ohio; Soils; Vapors

20080041131 National Center for Atmospheric Research, Boulder, CO USA
Large Eddy Simulations of Surface Winds Above Water Waves: Effects of Wind-Wave Alignment and Wave Age
Sullivan, Peter P; Jun 30, 2008; 62 pp.; In English
Contract(s)/Grant(s): N00014-06-M-0169
Report No.(s): AD-A483292; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483292

The research program undertaken is a follow on to the mini-workshop on calculating ship motions in geophysical environments held in early 2006 in Washington, DC. The long term goal of this research is to further the present understanding of turbulent flow over surface waves and the coupling with ocean currents, information which can potentially provide guidance for ship designs and motion prediction in extreme sea states. In the near term the research focuses on examining the sensitivity of the atmospheric surface winds (magnitude, direction, and statistics) to varying wind-wave orientation and wave age (i.e., equilibrium and non-equilibrium sea states) using idealized turbulence resolving large-eddy simulations (LESs). The output from the numerical simulations, statistics and visualization of surface-layer winds, forms a database which can then be used to identify wind-wave conditions that would adversely impact the motion of ships at sea. On a longer timeline algorithmic improvements to our LES will be pursued to allow simulations above a measured spectrum of 3D surface waves.
DTIC
Air Water Interactions; Alignment; Ground Wind; Large Eddy Simulation; Water; Water Waves

20080041172 Naval Research Lab., Washington, DC USA
Instability of a Planar Expansion Wave
Velikovich, A L; Zalesak, S T; Metzler, N; Wouchuk, J G; Oct 11, 2005; 12 pp.; In English
Report No.(s): AD-A483433; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483433

An expansion wave is produced when an incident shock wave interacts with a surface separating a fluid from a vacuum. Such an interaction starts the feedout process that transfers perturbations from the rippled inner (rear) to the outer (front) surface of a target in inertial confinement fusion. Being essentially a standing sonic wave superimposed on a centered expansion wave, a rippled expansion wave in an ideal gas, like a rippled shock wave, typically produces decaying oscillations of all fluid variables. Its behavior, however, is different at large and small values of the adiabatic exponent gamma. At gamma > 3, the mass modulation amplitude delta-m in a rippled expansion wave exhibits a power-law growth with time alpha tau(beta), where beta = (gamma - 3)/(gamma - 1). This is the only example of a hydrodynamic instability whose law of growth, dependent on the equation of state, is expressed in a closed analytical form. The growth is shown to be driven by a physical mechanism similar to that of a classical Richtmyer-Meshkov instability. In the opposite extreme gamma - 1 much less than

1, delta-m exhibits oscillatory growth, approximately linear with time, until it reaches its peak value approximately (gamma - 1)^(- 1/2), and then starts to decrease. The mechanism driving the growth is the same as that of Vishniac's instability of a blast wave in a gas with low gamma. Exact analytical expressions for the growth rates are derived for both cases and favorably compared to hydrodynamic simulation results.
DTIC
Elastic Waves; Inertial Confinement Fusion; Shock Waves

20080041256 Naval Postgraduate School, Monterey, CA USA
High-Speed Blade Vibration in a Transonic Compressor
Murphy, William P; Jun 2008; 57 pp.; In English
Report No.(s): AD-A483477; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This experiment was conducted to measure transverse vibrations of the blades in a transonic compressor rig at the Naval Postgraduate School. The compressor was instrumented with non-invasive laser light probes to measure changes in time of arrival of all the blades, relative to an expected arrival time. These times were then converted to blade deflections. Results proved that the primary observed vibration was a first bending mode. The frequencies that excited this mode precisely correlated with NASA predictions. It was shown that the modal frequency for the first bending mode was dependent on engine speed as a result of the untwisting blade. Maximum observed blade deflection was proved to occur during the surge event, resulting in maximum blade fatigue. It was concluded that certain operating regimes, with large blade deflections, should be avoided to extend blade life by limiting fatigue.
DTIC
Compressors; High Speed; Transonic Compressors; Vibration

20080041470 Idaho National Lab., Idaho Falls, ID, USA
Preliminary Study of Turbulent Flow in the Lower Plenum of a Gas-Cooled Reactor. NURETH-12
Guillen, D. P.; McIllroy, H. M.; Sep. 2007; 18 pp.; In English
Report No.(s): DE2007-918175; INL/CON-07-12792; No Copyright; Avail.: National Technical Information Service (NTIS)

A preliminary study of the turbulent flow in a scaled model of a portion of the lower plenum of a gas-cooled advanced reactor concept has been conducted. The reactor is configured such that hot gases at various temperatures exit the coolant channels in the reactor core, where they empty into a lower plenum and mix together with a crossflow past vertical cylindrical support columns, then exit through an outlet duct. An accurate assessment of the flow behavior will be necessary prior to final design to ensure that material structural limits are not exceeded. In this work, an idealized model was created to mimic a region of the lower plenum for a simplified set of conditions that enabled the flow to be treated as an isothermal, incompressible fluid with constant properties. This is a first step towards assessing complex thermal fluid phenomena in advanced reactor designs. Once such flows can be computed with confidence, heated flows will be examined. Experimental data was obtained using three-dimensional Particle Image Velocimetry (PIV) to obtain non-intrusive flow measurements for an unheated geometry. Computational fluid dynamic (CFD) predictions of the flow were made using a commercial CFD code and compared to the experimental data. The work presented here is intended to be scoping in nature, since the purpose of this work is to identify improvements that can be made to subsequent computations and experiments. Rigorous validation of computational predictions will eventually be necessary for design and analysis of new reactor concepts, as well as for safety analysis and licensing calculations.
NTIS
Computational Fluid Dynamics; Gas Cooled Reactors; Turbulent Flow

20080041473 Air Force Research Lab., Edwards AFB, CA USA
Atomization Rate of Gas-Centered Swirl-Coaxial Injectors (Preprint)
Lightfoot, Malissa D; Danczyk, Stephen A; Talley, Douglas G; Mar 19, 2008; 9 pp.; In English
Contract(s)/Grant(s): Proj-5026
Report No.(s): AD-A483326; AFRL-RZ-ED-TP-2008-074; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483326

Gas-centered swirl-coaxial injectors are garnering much interest in the area of liquid hydrocarbon rocket development. However, robust design criteria and scaling of these injectors remains unclear. Here an examination of primary atomization

has been undertaken through the study of a gas-centered swirl-coaxial injector. Film length is measured experimentally over a range of operating conditions and injector geometries. Experiments are performed at atmospheric pressure using water and nitrogen as working fluids. The atomization rate, reflected in the length of the intact liquid film, is related to the momentum flux ratio. Using the characteristic dimensions for determining the bulk velocities of the fluids, the film lengths of various injector geometries may be collapsed onto a single curve of nondimensionalized length versus momentum flux ratio. The injectors tested have a geometry which produces separated gas flow just prior to contact with the liquid. The effect of this recirculation zone on initial film height is discussed.
DTIC
Atomizing; Fluid Films; Fuel Injection; Injectors; Multiphase Flow

20080041697 Library of Congress, Washington, DC USA
The Global Nuclear Detection Architecture: Issues for Congress
Shea, Dana A; Jul 7, 2008; 25 pp.; In English
Report No.(s): AD-A483977; CRS-RL34564; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483977

In 2006, the Domestic Nuclear Detection Office (DNDO) was established within the Department of Homeland Security to centralize coordination of the federal response to an unconventional nuclear threat. The office was codified through the passage of the SAFE Port Act (P.L. 109-347) and given specific statutory responsibilities to protect the USA against radiological and nuclear attack, including the responsibility to develop a global nuclear detection architecture. Determining the range of existing federal efforts protecting against nuclear attack, coordinating the outcomes of these efforts, identifying overlaps and gaps between them, and integrating the results into a single architecture are likely to be evolving, ongoing tasks. The global nuclear detection architecture is a multi-layered system of detection technologies, programs, and guidelines designed to enhance the nation's ability to detect and prevent a radiological or nuclear attack. Among its components are existing programs in nuclear detection operated by other federal agencies and new programs put into place by DNDO. The global nuclear detection architecture is developed by DNDO in coordination with other federal agencies implementing nuclear detection efforts and this coordination is essential to the success of the architecture. This architecture is a complicated system of systems. Measuring the success of the architecture relative to its individual components and the effectiveness of additional investments are challenges. The DNDO is developing risk and cost methodologies to be applied to the architecture in order to understand and prioritize the various nuclear detection programs and activities in multiple federal agencies.
DTIC
Detection; Radiology; Security

20080041877 General Accounting Office, Washington, DC USA
Nuclear Detection. Preliminary Observations on the Domestic Nuclear Detection Office's Efforts to Develop a Global Nuclear Detection Architecture
Maurer, David C; Jul 16, 2008; 20 pp.; In English
Report No.(s): AD-A484311; GAO-08-999T; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In April 2005, a Presidential Directive established the Domestic Nuclear Detection Office (DNDO) within the Department of Homeland Security to enhance and coordinate federal, state, and local efforts to combat nuclear smuggling domestically and abroad. DNDO was directed to develop, in coordination with the departments of Defense (DOD), Energy (DOE), and State (State), an enhanced global nuclear detection architecture -- an integrated system of radiation detection equipment and interdiction activities. DNDO implements the domestic portion of the architecture, while DOD, DOE, and State are responsible for related programs outside the U.S. This testimony provides preliminary observations based on ongoing work addressing (1) the status of DNDO's efforts to develop a global nuclear detection architecture, (2) the challenges DNDO and other federal agencies face in implementing the architecture, and (3) the costs of the programs that constitute the architecture. This statement draws on prior GAO reviews of programs constituting the architecture, and GAO's work on strategic planning. GAO recommends that DNDO develop, in coordination with DOD, DOE, and State, a strategic plan to guide agency efforts to develop a more comprehensive architecture. In commenting on a draft of this statement, DNDO concurred with this recommendation.
DTIC
Detection; Management Planning; Planning

20080042005 Washburn (Woodcodk), LLP, Philadelphia, PA, USA; Pennsylvania Univ., Philadelphia, PA, USA
Nano- and Micro-Scale Structures: Methods, Devices and Applications Thereof
Bau, H. H., Inventor; Kim, B. M., Inventor; 21 Sep 05; 21 pp.; In English
Contract(s)/Grant(s): CTS-0210579
Patent Info.: Filed Filed 21 Sep 05; US-Patent-Appl-SN-11-231 425
Report No.(s): PB2008-102485; No Copyright; Avail.: CASI: A03, Hardcopy

Disclosed are methods for fabricating integrated nano-scale and micro-scale structures. Also disclosed are carbon nanopipettes, shovels, and sheets made by these methods. Nano-scale and micro-scale structures fabricated by the disclosed methods are useful in a variety of application, for example, nanoelectrodes, functionalized probes for chemical and biological sensing, nanopipettes for fluid and macromolecule transfer, and devices for the dispensing and deposition of nanodrops.
NTIS
Patent Applications; Macromolecules; Nanostructure (Characteristics)

20080042055 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Development and Optimization of a Positron Annihilation Lifetime Spectrometer to Measure Nanoscale Defects in Solids and Borane Cage Molecules in Aqueous Nitrate Solutions
Ross, Matthew A; Mar 2008; 103 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483604; AFIT/GNE/ENP/08-M05; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A Positron Annihilation Lifetime Spectroscopy (PALS) system was developed and tested. PALS has the capability to characterize negatively charged defects and voids in materials such as explosives. The timing resolution of the optimized system is 197 +or- 14 ps as measured with a known (60)Co source. A single-crystal tungsten sample was used to confirm the system calibration resulting in a lifetime of 101 +or- 2 ps (as compared to 105 +or- 5 ps in the literature (16)). The PALS system was then used to compare the differences between as grown and neutron-irradiated single crystal silicon carbide (SiC), illustrating that neutron bombardment of SiC results in the creation of silicon vacancies in the material. The lifetime of a positron associated with a boron cage anion, dodecahydrododecaborate in aqueous nitrate solution, was 277 +or- 10 ps, compared with previous measurements of the cage compound in solid state which yielded 268 +or- 8 ps. Competition for positrons between nitrate anion and the boron cage was measured.
DTIC
Aqueous Solutions; Boranes; Defects; Molecules; Nitrates; Positron Annihilation; Positrons; Solids; Spectrometers; Spectroscopy

20080042192 Wright State Univ., Dayton, OH USA
Study of the Issues of Computational Aerothermodynamics Using a Riemann Solver
Menart, James A; Henderson, Sean J; Jul 2008; 208 pp.; In English
Contract(s)/Grant(s): F33615-02-C-3254; Proj-A02E
Report No.(s): AD-A483862; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483862

This work is part of a project to more accurately model hypersonic flow. A number of issues in hypersonic flow are addressed. The first issue addressed is that of air properties at increased temperatures. Thermodynamic and transport properties of chemical equilibrium air are found for temperatures up to 30,000 K for a pressure range from 1x10-4 to 100 atm. This work also covers adding equilibrium air chemistry to the computational fluid dynamics computer code known as AVUS. The second issue addressed is the carbuncle problem. A grid study is performed and recommendations as to what types of structured grids should be used to reduce the carbuncle problem are made. Grid aspect ratio and the alignment of the grid to the flow can be used to reduce the effects of the carbuncle phenomenon. Another mechanism causing the carbuncle phenomenon is the alignment of the grids with the shock. The third issue addressed is the domain of applicability of the perfect gas model, equilibrium air model, nonequilibrium air model, and thermo-chemical nonequilibrium air model. A computational study is carried out using AVUS to determine the regions of applicability of these air models for a blunt body at various velocities and altitudes. This work is part of a project to more accurately model hypersonic flow. A number of issues in hypersonic flow are addressed. The first issue addressed is that of air properties at increased temperatures. In particular the thermodynamic and transport properties of chemical equilibrium air are found for temperatures up to 30,000 K for a pressure range from 1x10-4 to 100 atm. This work provides properties at slightly higher temperatures for the lower pressure region than can be found in

the literature. This work also covers adding equilibrium air chemistry to the computational fluid dynamics computer code known as AVUS.
DTIC
Aerothermodynamics; Hypersonic Flow

20080042372 Morris Manning and Martin, LLP, Atlanta, GA, USA
Bioreactors with Substance Injection Capacity
Wikswo, J. P., Inventor; Baudenbacher, F. J., Inventor; Haselton, F., Inventor; Lin, C. P., Inventor; 27 Aug 03; 74 pp.; In English
Contract(s)/Grant(s): N66001-01-C-8064
Patent Info.: Filed Filed 27 Aug 03; US-Patent-Appl-SN-10-525 648
Report No.(s): PB2008-104708; No Copyright; Avail.: CASI: A04, Hardcopy

A bioreactor with substance injection capability. In one embodiment, the bioreactor includes a first substrate having a first surface, an opposite second surface and edges. The bioreactor further includes a second substrate having a first surface and an opposite second surface, defining a cavity with a bottom surface, where the bottom surface is located there between the first surface and the second surface. The first surface of the first substrate is received by the second surface of the second substrate to cover the cavity so as to form a chamber for receiving cells and a liquid medium. A port is formed in the second substrate between the bottom surface and the first surface of the second substrate. As formed, the port is in fluid communication with the chamber to allow a stream of substance to be introduced into the chamber. The stream of substance is controlled so as to provide a gradient, or a concentration gradient of the substance, to the chamber. The stream of substance includes a substance affecting the growth of cells such as chemokine.
NTIS
Bioreactors; Injection; Patent Applications

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INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography. For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Avionics and Aircraft Instrumentation*; and *19 Spacecraft Instrumentation and Astrionics*.

20080040899 Fulbrigh and Jaworski, LLP, Los Angeles, CA, USA
Scanner for Probe Microscopy
Hansma, P. K., Inventor; Fantner, G., Inventor; Kindt, J. H., Inventor; 30 Nov 04; 19 pp.; In English
Contract(s)/Grant(s): NSF-DMR9988640; NSF-DMR0080034
Patent Info.: Filed Filed 30 Nov 04; US-Patent-Appl-SN-11-000 589
Report No.(s): PB2008-104357; No Copyright; Avail.: CASI: A03, Hardcopy

A scanner for probe microscopy that avoids low resonance frequencies and accounts better for piezo nonlinearities. The x, y and z axes of a linear stack scanner are partially decoupled from each other while maintaining all mechanical joints stiff in the direction of actuation. The scanning probe microscope comprises a probe, a housing, at least two actuators, each coupled to the housing, and a support coupled to the housing and to at least a first of the actuators at a position spaced from the point at which the actuator is coupled to the housing. The support constrains the motion of the first actuator along a first axis while permitting translation along a second axis. The actuators are preferably orthogonally arranged linear stacks of flat piezos, preferably in push-pull configuration. The support can take different forms in different embodiments of the invention. In a particular embodiment, the scanner is a 2D scanner having a support frame with x and y axes, and a member for supporting an object to be moved such as a sample for a probe, the scanner comprising a flexure and flexure coupled cross-conformed piezos arranged along x and y axes. Expansion of the piezos is measured by at least two strain gauges disposed to measure the differential motion of at least two opposed actuators. The strain gauges are preferably arranged to compensate for ambient temperature changes, and preferably two or more strain gauges of identical type are disposed on each actuator to magnify the strain signal.
NTIS
Microscopy; Scanners; Strain Gages

20080041090 Ohio State Univ., Columbus, OH USA
Cross Layer Issues in Sensor Networks: A Line in the Sand
Arora, Anish; Kulathumani, Vinod; Jun 2004; 17 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483201; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483201
No abstract available
Detection; Networks; Sands; Warning Systems

20080041364 Army Research Lab., Adelphi, MD USA
Evolution of a MEMS Photoacoustic Chemical Sensor
Pellegrino, Paul M; Polcawich, Ronald G; Jul 1, 2003; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483776; No Copyright; Avail.: Defense Technical Information Center (DTIC)
Photoacoustic spectroscopy is a useful monitoring technique that is well suited for trace gas detection. The technique also possesses favorable detection characteristics when the system dimensions are scaled to a micro-system design. The objective of present work is to incorporate two strengths of the Army Research Laboratory (ARL), piezoelectric microelectromechanical systems (MEMS) and chemical and biological sensing into a monolithic MEMS photoacoustic trace gas sensor. A miniaturized macro-cell design was studied as a means to examine performance and design issues as the photoacoustics is scaled to a dimension approaching the MEMS level. Initial MEMS work is centered on fabrication of a lead zirconate titanate (PZT) microphone subsystem to be incorporated in the full photoacoustic device. Preliminary results were very positive for the macro-photoacoustic cell, PZT membrane microphones design / fabrication and elementary monolithic MEMS photoacoustic cavity.
DTIC
Gas Detectors; Microelectromechanical Systems; Photoacoustic Spectroscopy; Piezoelectric Transducers; Sensors

20080041585 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Variable-delay Polarization Modulators (VPMs) for Far-infrared through Millimeter Astronomy
Chuss, David T.; July 07, 2008; 26 pp.; In English; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041585
This viewgraph presentation reviews the use of Variable-delay Polarization Modulators (VPMs) for Far-infrared through Millimeter Astronomy. The two science goals are to use polarized emission from the partially-aligned dust that provides a probe of the role of magnetic fields in star formation and to use the polarization of the cosmic microwave background radiation CMB to test theories of the very early universe and provide a probe of fundamental physics.
CASI
Modulators; Polarization Modulation; Polarized Electromagnetic Radiation; Optical Polarization

20080041624 Arizona State Univ., Tempe, AZ USA
Coherent Doppler Lidar Deployment in the Canopy Horizontal Array Turbulence Study
Calhoun, Ronald J; Fernando, H J S; Feb 6, 2008; 15 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-07-1-0137
Report No.(s): AD-A483797; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483797
The PI's and ASU students/staff deployed their coherent Doppler lidar from May 9, 2007 to June 11, 2007 in support of the Canopy Horizontal Array Turbulence Study (CHATS) The experiment took place in a walnut orchard near Davis, California The overall purpose of the experiment was to investigate the character of within-canopy Sub-Filter-Scale motions The full experiment occurred in two segments: A) from March 18 - April 18, and B) from May 10 - June 10th The time period between the two measurement periods corresponded with the transition of the walnut grove from bare branches to full foliage The ASU lidar group joined the experiment for the second phase The primary motivations of the ASU lidar deployment were:
DTIC
Deployment; Doppler Radar; Optical Radar; Turbulence

20080041685 California Univ., Santa Barbara, CA USA

Development of III-Nitride Materials for IR Applications

Speck, James S; Jun 16, 2008; 70 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0229

Report No.(s): AD-A483946; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483946

This project will cover three areas: (1) development of InN, (2) growth and properties of GaN/AlN nanostructures for intersubband transitions, and (3) GaN Quantum Dots for intersubband transitions. This project will develop nitride materials for use in the near and mid-infrared portions of the electromagnetic spectrum. USAF needs IR materials for infrared countermeasures, sensor protection, and sensor sources and detectors. The nitrides have the advantages of being rad-hard. They also have large band offsets that make intersubband transition in the IR possible.

DTIC

Indium; Infrared Detectors; Nitrides; Optical Countermeasures

20080041687 Geo-Centers, Inc., Aberdeen Proving Ground, MD USA

An Infrared Image Acquisition and Analysis Method for Quantifying Optical Responses to Chemical Agent Vapor Exposure

Miller, Dennis B; Hulet, Stanley W; Benton, Bernard J; Mioduszewski, Robert J; Whalley, Christopher E; Carpin, John C; Thomson, Sandra A; Jul 1, 2003; 8 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483953; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483953

A method was developed employing an infrared (IR) light source, IR capable video camera, digital processor and image acquisition/analysis software for quantifying pupil constriction resulting from nerve agent vapor exposure. Image acquisition and analysis routines were developed to capture images and automate pupil area measurements or manually analyze images based upon operator-selected parameters. The latter option is useful in cases where the pupil image is partially obstructed or pupil shape is other than circular. The method described here allows for remote/non-invasive assessment of the level as well as the time course of onset and duration of pupil constriction.

DTIC

Digital Cameras; Exposure; Image Analysis; Infrared Imagery; Nerves; Optical Properties; Photographic Processing; Vapors

20080041727 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA

Field Tests of the Laser Interrogation of Surface Agents (Lisa) System for On-the-Move Standoff Sensing of Chemical Agents

Chyba, Thomas H; Higdon, N S; Armstrong, Wayne T; Lobb, C T; Ponsardin, Patrick L; Richter, Dale A; Kelly, Brian T; Bui, Quang; Babnick, Robert; Boysworth, Marc K; Jul 1, 2003; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD13-01-C-0018

Report No.(s): AD-A484089; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA484089

Laser Interrogation of Surface Agents (LISA) is a new technique based on short-range Raman sensing that provides standoff detection and identification of surface-deposited chemical agents. ITT Industries, Advanced Engineering and Sciences Division is currently developing the LISA technology under a cost-sharing arrangement with the U.S. Army Soldier and Biological Chemical Command (SBCCOM) for incorporation on the Army's future reconnaissance vehicles. We will discuss the field engineered prototype LISA-Recon system, designed to demonstrate single-shot on-the-move measurements of chemical contaminants at concentration levels below the Army's requirements. Results from laboratory and field tests will be presented. Proper identification of chemical contamination requires an on-board library of high-resolution UV Raman signatures. Laboratory measurements of these Raman spectra are presented in a companion paper.

DTIC

Detection; Field Tests; Interrogation; Lasers

20080041728 Army Research Lab., Adelphi, MD USA

Fluorescence Hybridization Assay Based On Chitosan-Linked Softarrays

Sumner, James J; Gillespie, James B; Yi, Hyunmin; Wu, Li-Qun; Payne, Gregory F; Bentley, William E; Jul 1, 2003; 10 pp.; In English

Report No.(s): AD-A484090; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA484090

The work to be presented is examining the development of a hybridization-based biosensor. The design of a high throughput assay based on standard laboratory instrumentation and 96-well microtiter plates will be discussed as well as a highly sensitive sensor using a novel tapered fiber optic probe. The immobilization chemistry learned in the 96-well plate will be implemented on the fiber optic sensor. The high throughput assay is based on the immobilization of single-stranded, synthetic oligonucletides inside a 96-well plate utilizing chitosan and glutaraldehyde. Chitosan is a biopolymer with abundant primary amines for attachment chemistry and is easily deposited as thin layers on surfaces. Hybridization can take place inside the wells with a complementary analyte sequence followed by a fluorescent, labeled signaling probe to form a sandwich assay. The hybridized wells can be interrogated with any bench-top fluorometer with a microwell plate reader.

DTIC

Assaying; Biological Effects; Detection; Fluorescence

20080041849 Michigan Technological Univ., Houghton, MI USA

Image Reconstruction, Wave Front Sensing, and Adaptive Optics in Extreme Atmospheric Seeing Conditions

Roggemann, Michael C; Schulz, Timothy J; Jun 2, 2008; 13 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-0404

Report No.(s): AD-A484241; No Copyright; Avail.: Defense Technical Information Center (DTIC)

On June 1, 2005 AFOSR awarded a grant to Michigan Technological University to investigate image reconstruction, wave front sensing, and adaptive optics in extreme imaging conditions. This is the final report for this program. The overall goal was to understand imaging under conditions where seeing is exceedingly poor, such as for space surveillance of objects at very low elevation angles, and during daytime hours. In these situations, scintillation and small isoplanatic angles dominate the image measurement and reconstruction problems. Our work was focused on performing trade-offs in the adaptive optics control algorithms for imaging under conditions of poor seeing arising from large zenith angles. In particular, we have developed a closed loop simulation of an adaptive optics system which is physically similar to the AEOS system, that uses the conventional least squares reconstructor, the exponential reconstruction, and the so-called 'slope discrepancy' reconstructor. We have also examined the use of the stochastic parallel gradient descent (SPGD) algorithm for deformable mirror control in problems dominated by scintillation and anisoplanatism, and conducted a laboratory experiment to demonstrate this idea. In this report we document the results. Our work with maximum likelihood-based image reconstruction algorithms has been applied to the results provided by the adaptive optics simulation, and representative results are included here.

DTIC

Adaptive Optics; Atmospheres; Detection; Image Reconstruction; Seeing (Astronomy); Wave Fronts

20080042008 Sigtem Technology, Inc., San Mateo, CA USA

Post-Correlation Semi-Coherent Integration for High-Dynamic and Weak GPS Signal Acquisition (Preprint)

Yang, Chun; Nguyen, Thao; Blasch, Erik; Miller, Mikel; Jun 2008; 12 pp.; In English

Contract(s)/Grant(s): FA8650-05-C-1828; Proj-3005

Report No.(s): AD-A484228; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A new approach to weak GPS signal acquisition is presented in this paper. It belongs to the category of approaches that aim at enhancing the sensitivity of standalone GPS receivers without network assistance, which is also called unaided GPS receivers. Acquisition and ultimate tracking of a weak GPS signal (e.g., in an in-door environment) faces several technical challenges, notably, possible data bit sign reversal every 20 ms and tolerable frequency error inversely proportional to the integration interval. Brute force search over all possible combinations of the unknown values is prohibitive computationally. Aided GPS relying on external infrastructure for timing, data bit, and frequency error information is costly. Coherent techniques such as the block accumulating coherent integration over extended interval (BACIX) have recently been proposed to extend coherent integration. Although efficient, such coherent methods may still be too expensive except for high-end receivers and may not maintain the SNR performance when there are large frequency changes over the intended integration interval. In this paper, we set forth a novel method that utilizes the semi-coherent scheme for post-correlation integration, which is named as ?block accumulating semi-coherent integration of correlations? or BASIC. It can be viewed as an extension

of the BACIX algorithm. Although less sensitive than coherent integration, semi-coherent integration based on inter-block conjugate products is computationally more efficient. In addition, it can handle large frequency changes. The BASIC algorithm is first formulated in the paper. Computer simulation results are then presented to illustrate operation and performance of the BASIC algorithm for joint estimation of the initial frequency, chirping rate (frequency rate), bit sync, and bit sign pattern.
DTIC
Dynamic Range; Global Positioning System; Signal Processing

20080042057 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Time-Frequency Analysis of Terahertz Radar Signals for Rapid Heart and Breath Rate Detection
Massar, Melody L; Jun 2008; 81 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483261; AFIT/GAM/ENC/08-05; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483261

We develop new time-frequency analytic techniques which facilitate the detection of a person's heart and breath rates from the Doppler shift the movement of their body induces in a terahertz radar signal. One straightforward means of doing such an analysis is the following: take the spectrogram of the ridgeline of the spectrogram of the radar signal. Instead of following this approach exactly, we consider an alternate method in which the ridgeline of the radar signal's spectrogram is replaced with a signal computed from spectral centroids. By using spectral centroids, rather than the ridgeline, we produce a smooth signal that avoids traditional problems with ridgelines, such as jump discontinuities and overquantization. This new method for time-frequency analysis uses a Toeplitz matrix-based algorithm that has a fast Fourier transform-based implementation, and permits centroids of the vertical strips of the spectrogram of the radar signal to be computed without ever having to explicitly compute the spectrogram itself.
DTIC
Frequencies; Heart Rate; Time Signals

20080042072 Sigtem Technology, Inc., San Mateo, CA USA
Constrained Estimation for GPS/Digital Map Integration (Postprint)
Miller, Mikel; Nguyen, Thao; Blasch, Erik; Yang, Chun; Jan 2007; 12 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8650-05-C-1828; Proj-3005
Report No.(s): AD-A484226; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Linear and nonlinear constrained estimation is investigated in this paper as an optimal method to integrate GPS fixes with digital maps so as to improve accuracy and reliability. In addition to emergency location and roadside assistance, the integration of GPS with digital maps becomes an increasingly popular application in automotives particularly for real-time routing, driving guidance, and street prompting. A position fix is obtained by a GPS receiver, which may be subject to significant errors in urban canyons due to such effects as multipath and weak signal, whereas a digital map provides the road network of a region in which a user is traveling. When the information about roads is as accurate as (or even better than) GPS measurements, it is desired naturally to incorporate such information into position solution. In this paper, roads are modeled with analytic functions and its integration (fusion) with a GPS position fix is cast as linear and/or non-linear state constraints in an optimization procedure. Similarly, the velocity estimates and the road directions are treated as another pair of constraints. The constrained optimization is then solved with the Lagrangian multiplier, leading to a closed-form solution for linear constraints and an iterative solution for nonlinear constraints. Geometric interpretations of the solutions are provided for simple cases. Computer simulation results are presented to illustrate the algorithms.
DTIC
Digital Data; Global Positioning System; Maps

20080042270 Heslin Rothenberg Earley and Mesiti, PC, Albany, NY, USA; X-Ray Optical Systems, Inc., Greenbush, NY, USA
In-Situ X-Ray Diffraction System Using Sources and Detectors at Fixed Angular Positions
Gibson, D. M., Inventor; Gibson, W. M., Inventor; Huang, H., Inventor; 3 Feb 06; 22 pp.; In English
Contract(s)/Grant(s): DE-FG02-99ER82918
Patent Info.: Filed Filed 3 Feb 06; US-Patent-Appl-SN-11-346 699
Report No.(s): PB2008-103930; No Copyright; Avail.: CASI: A03, Hardcopy

An x-ray diffraction technique for measuring a known characteristic of a sample of a material in an in-situ state. The technique includes using an x-ray source for emitting substantially divergent x-ray radiation with a collimating optic disposed

with respect to the fixed source for producing a substantially parallel beam of x-ray radiation by receiving and redirecting the divergent paths of the divergent x-ray radiation. A first x-ray detector collects radiation diffracted from the sample; wherein the source and detector are fixed, during operation thereof, in position relative to each other and in at least one dimension relative to the sample according to a-priori knowledge about the known characteristic of the sample. A second x-ray detector may be fixed relative to the first x-ray detector according to the a-priori knowledge about the known characteristic of the sample, especially in a phase monitoring embodiment of the present invention.
NTIS
X Ray Diffraction; X Ray Sources; In Situ Measurement

20080042408 NASA Dryden Flight Research Center, Edwards, CA, USA
Advanced IR System For Supersonic Boundary Layer Transition Flight Experiment
Banks, Daniel W.; October 07, 2008; 23 pp.; In English; Fundamental Aeronautics Program Annual Meeting 2008, 7-9 Oct. 2008, Atlanta, GA, USA; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080042408

Infrared thermography is a preferred method investigating transition in flight: a) Global and non-intrusive; b) Can also be used to visualize and characterize other fluid mechanic phenomena such as shock impingement, separation etc. F-15 based system was updated with new camera and digital video recorder to support high Reynolds number transition tests. Digital Recording improves image quality and analysis capability and allows for accurate quantitative (temperature) measurements and greater enhancement through image processing allows analysis of smaller scale phenomena.
Derived from text
Nonintrusive Measurement; F-15 Aircraft; Digital Systems; Boundary Layer Transition; Infrared Instruments; Transition Flight; Supersonic Boundary Layers; Thermography; Cameras

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LASERS AND MASERS

Includes lasing theory, laser pumping techniques, maser amplifiers, laser materials, and the assessment of laser and maser outputs. For cases where the application of the laser or maser is emphasized see also the specific category where the application is treated. For related information see also *76 Solid-State Physics*.

20080040863 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Eye Safe, Visible Wavelength Lidar Systems: Design and Operational Advances, Results and Potential
Spinhirne, James; Welton, Ellsworth J.; Berkoff, Timothy; Campbell, James; July 22, 2007; 2 pp.; In English; IGARSS 2007 Symposium, 22-28 Jul. 2007, Barcelona, Spain; Copyright; Avail.: Other Sources; Abstract Only

In the early nineties the first of the eye safe visible wavelength lidar systems known now as Micro Pulse Lidar (MPL) became operational. The important advance of the design was a system that, unlike most existing lidar, operated at eye safe energy densities and could thus operate unattended for full time monitoring. Since that time there have been many dozens of these systems produced and applied for full time profiling of atmospheric cloud and aerosol structure. There is currently an observational network of MPL sites to support global climate research. In thc course of application of these instruments there have been significant improvements in the, design and performance of the systems. In the last half decade particularly there has been significant application and technical development of MPL systems. In this paper we review progress. The current MPL systems in use are all single wavelength systems designed for cloud and aerosol applications. For the cloud and aerosol applications, both lidar depolarization and multi wavelength measurements have significant applications. These can be accomplished with the MPL, approach. The main current challenge for the lidar network activity are in the area of the reliability, repeatability and efficiency of data processing. The network makes use of internet data downloads and automated processing. The heights of all cloud and aerosol layers are needed. The recent emphasis has been in operationally deriving aerosol extinction cross section. Future emphasis will include adding cirrus optical parameters. For operational effectiveness, improvements to simplify routine data signal calibration are being researched. Overall the MPL systems have proven very effective. A large data base of results from globally distributed sites can be easily accessed through the internet. Applications have included atmospheric model development. Validation of current global satellite observations of aerosol and clouds,

including now orbital lidar observations, was a primary goal for NASA. Although sampling issues require careful consideration, results have proven useful.
Derived from text
Optical Radar; Wavelengths; Visible Spectrum; Design Analysis; Eye (Anatomy); Eye Protection

20080041058 Science Applications International Corp., McLean, VA USA
Direct Observation of Feedout-Related Mass Oscillations in Plastic Targets
Aglitskiy, Y; Velikovich, A L; Karasik, M; Serlin, V; Pawley, C J; Schmitt, A J; Obenschain, S P; Mostovych, A N; Gardner, J H; Metzler, N; Dec 2001; 16 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483123; XB-NRL/MR/6700; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483123

Feedout means the transfer of mass perturbations from the rear to the front surface of a driven target. When a planar shock wave breaks out at a rippled rear surface of the target, a lateral pressure gradient drives sonic waves in a rippled rarefaction wave propagating back to the front surface. This process redistributes mass in the volume of the target, forming the feedout-generated seed for ablative Rayleigh-Taylor (RT) instability. We report the first direct experimental observation of areal mass oscillation associated with feedout, followed by the onset of exponential RT growth.
DTIC
Laser Targets; Observation; Oscillations; Shock Waves; Targets

20080041059 Naval Research Lab., Washington, DC USA
Molecular Beam Epitaxy Growth and Characterization of Mid-IR Type-II 'W' Diode Lasers
Canedy, C L; Bewley, W W; Boishin, G I; Kim, C S; Vurgaftman, I; Kim, M; Meyer, J R; Whitman, L J; Jun 7, 2005; 7 pp.; In English
Report No.(s): AD-A483125; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483125

Type II 'W' diodes designed for emission at the spectral line of methane (3.31 micrometer) when operated near 80 K were grown on a compact 2IT RIBER molecular beam epitaxy system. Photoluminescence and cross-sectional scanning tunneling microscopy were used as tools to improve the growth quality of these structures. The diodes exhibited very low housing thresholds at T=80 K (24-40 A/cm(2)), although further development will be required to enhance the characteristic temperature (T(o) approx. 40 K) and the maximum operating temperature (approx. 190 K). The lasers had favorable internal losses at all T up to 190 K (approx. 7 cm(-1), and favorable internal efficiencies at low T (up to 85%). The I-V characteristics of nonlasing test structures were improved substantially by adding n-side 'transition' regions that smoothed out abrupt steps in the conduction-band offset.
DTIC
Antimonides; Infrared Radiation; Molecular Beam Epitaxy; Semiconductor Lasers

20080041061 Naval Research Lab., Washington, DC USA
Microscopic Characterization of InAs/In(0.28)GaSb(0.72)/InAs/AlSb Laser Structure Interfaces
Barvosa-Carter, W; Twigg, M E; Yang, M J; Whitman, L J; Jun 4, 2001; 12 pp.; In English
Report No.(s): AD-A483127; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483127

We have used cross-sectional scanning tunneling microscopy (XSTM) and transmission electron microscopy (TEM) to study InAs/In(0.28)Ga(0.72)Sb/InAs/AlSb strained-layer heterostructures designed for use in infrared lasers. The samples came from the same material previously characterized by photoluminescence (PL) and x-ray diffraction [M. J. Yang et al., J. Appl. Phys. 86, 1796 (1999)]. Several structures grown at different temperatures and with either III-As or III-Sb-like interfacial bonds have been characterized. Analysis of high-resolution TEM images finds the same degree of interfacial roughness (approx. 1 ML) for both III-As and III-Sb interfacial bonded heterostructures, despite significantly greater PL intensity in the latter. We also implement and compare two different methods for analyzing the interfacial roughness using XSTM; both show that the crucial InAs/InGaSb interface is rougher in the samples grown at high temperature. Even in samples grown at the optimal temperature (approx. 440 deg C), XSTM reveals intermixing at the AlSb-on-InAs interfaces, as well as unexpected differences in the interfacial bond types at the InAs-on-AlSb vs AlSb-on-InAs interfaces. Whereas all

layers grown at or below the optimal growth temperature appear defect-free in TEM, threading dislocations are observed in samples grown at higher temperature.
DTIC
Lasers; Superlattices; Surface Roughness

20080041067 Brookhaven National Lab., Upton, NY USA
Ultraviolet Raman Spectral Signatures in Support of Lisa (Laser Interrogation of Surface Agents)
Sedlacek, III, Arthur J; Finfrock, Charles C; Christesen, Steve; Chyba, Tom; Higdon, Scott; Jul 1, 2003; 10 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483156; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483156

SBCCOM/PNBC and ITT Industries are in a Cost-sharing venture on the development of LISARecon (Laser Interrogation of Surface Agents). This engineering, testing and evaluation effort uses a novel mini-Raman lidar technique for on-the-move, short-range, non-contact detection and identification of chemical agents on the battlefield. Unlike traditional lidar, LISA-Recon is specifically designed to analyze ground/surface contamination at a distance of approximately 1 meter. It is envisioned that the finished unit will reside on the NBCRS 'Fox' vehicle. In support of this ongoing engineering effort, Brookhaven, Edgewood and ITT Industries have teamed up to procure the relevant Raman spectral signatures for various agents and their respective surrogates. A brief introduction to UV Raman spectroscopy along with selected spectral signatures, cross-sections and implications to the LISA technology will be presented.
DTIC
Interrogation; Lasers; Raman Spectra; Spectral Signatures; Ultraviolet Spectra

20080041074 Science Applications International Corp., McLean, VA USA
Laser Imprint Reduction with a Short Shaping Laser Pulse Incident Upon a Foam-Plastic Target
Metzler, Nathan; Velikovich, Alexander L; Schmitt, Andrew J; Gardner, John H; Dec 2002; 38 pp.; In English
Report No.(s): AD-A483172; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483172

In the previous work [Metzler et al., Phys. Plasmas 6, 3283 '1999"] it was shown that a tailored density profile could be very effective in smoothing out the laser beam non-uniformities imprinted into a laser-accelerated target. However, a target with a smoothly graded density is difficult to manufacture. A method of dynamically producing a graded density profile with a short shaping laser pulse irradiating a foam layer on top of the payload prior to the drive pulse is proposed. It is demonstrated that the intensity and the duration of the shaping pulse, the time interval between the shaping pulse and the drive pulse, and the density ratio between the foam and the payload can be selected so that the laser imprint of the drive pulse is considerably suppressed without increasing the entropy of the payload. The use of the foam-plastic target and a shaping pulse reduces the imprinted mass perturbation amplitude by more than an order of magnitude compared to a solid plastic target. The requirements to the smoothing of the drive and shaping laser beams and to the surface finish of the foam-plastic sandwich target are discussed.
DTIC
Foams; Laser Beams; Laser Targets; Lasers; Pulsed Lasers; Surface Finishing; Targets

20080041075 Naval Research Lab., Washington, DC USA
Feedout and Richtmyer-Meshkov Instability at Large Density Difference
Velikovich, Alexander L; Schmitt, Andrew J; Gardner, John H; Metzler, Nathan; Jan 2001; 55 pp.; In English
Report No.(s): AD-A483173; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483173

The feedout process transfers mass perturbations from the rear to the front surface of a driven target, producing the seed for the Rayleigh-Taylor (RT) instability growth. The feedout mechanism is investigated analytically and numerically for the case of perturbation wavelength comparable to or less than the shock-compressed target thickness. The lateral mass flow in the target leads to oscillations of the initial mass non-uniformity before the reflected rippled rarefaction wave breaks out, which may result in RT bubbles produced at locations where the areal mass was initially higher. This process is determined by the evolution of hydrodynamic perturbations in the rippled rarefaction wave, which is not the same as the Richtmyer-Meshkov (RM) interfacial instability. An exact analytical formula is derived for the time-dependent mass variation in a rippled rarefaction wave, and explicit estimates are given for the time of first phase reversal and frequency of the oscillations. The

limiting transition from the case of RM perturbation growth at large density difference 'low ambient density behind the rear surface' to the case of feedout 'zero density' is studied, and it is shown that the latter limit is approached only if the ambient density is extremely low, less than 1/1000 of the pre-shock target density.
DTIC
Hydrodynamics; Laser Targets; Shock Waves

20080041076 Naval Research Lab., Washington, DC USA
Three-Dimensional Filamentation of Light in Laser Plasmas
Schmitt, Andrew J; Jan 1991; 30 pp.; In English
Report No.(s): AD-A483174; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483174

The first calculations of time-dependent laser-plasma filamentation in three dimensions are reported. These calculations are done with a three-dimensional laser propagation code based on a previous two-dimensional code. The effect of incident beam structure, and in particular optical smoothing techniques, on the behavior of filamentation is studied. Both ponderomotive and thermal conduction dominated nonlinearities are considered, and calculations are done simulating both homogeneous non-absorbing plasmas and inhomogeneous laboratory plasmas. Random phase screen (RPS) and induced spatial incoherence (ISI) optical smoothing techniques are investigated and compared to generic unsmoothed laser beams. Qualitative examples are presented and scaling studies are done and compared to a simple theoretical analysis, In typical laser-plasma interactions without optical smoothing, three-dimensional effects lead to greatly increased filament intensities, as expected. Peak filament intensities of order 100-500 times the average intensity are routinely observed (without optical smoothing), as compared to earlier two dimensional calculations where peak intensities were of order 10-50 times average. In spite of this tendency to create stronger filaments, three-dimensional filamentation (when measured on a time-averaged basis) can be suppressed by using ISI smoothing. Under the same conditions, instantaneous ISI intensities can show considerable enhancement, although much less than the unsmoothed beams. RPS smoothing exhibits less filamentation suppression. Under laser-fusion reactor conditions, calculations indicate that ISI suppression can completely eliminate filamentation.
DTIC
Laser Beams; Laser Plasmas; Lasers; Smoothing

20080041077 Naval Research Lab., Washington, DC USA
New High Gain Target Design for a Laser Fusion Power Plant
Bodner, S E; Colombant, D G; Schmitt, A J; Gardner, J H; Lehmberg, R H; Obenschain, S P; Jun 7, 2000; 7 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483175; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483175

We have developed a new direct-drive target design that has a predicted energy gain of 127 using a 1.3 MJ KrF laser and a gain of 155 using 3.1 MJ. The DT fuel is surrounded by an ablator consisting of a low density CH foam filled with frozen DT. The ablator is then surrounded by a thin CH coating and a very thin high-Z overcoat. The energy gain of 127-155 is possible through the use of (1) direct-drive laser-target coupling; (2) controlled levels of radiative preheating that keeps the DT fuel on a low isentrope (3) a short 1/4 micrometer laser wavelength for maximum absorption and rocket efficiencies (4) reduction of the laser beam focal spot size during the implosion (zooming) so that the focal spot size better matches the imploding target size and (5) ISI optical smoothing to minimize the laser nonuniformities at both high and low mode numbers. In addition to its high energy gain this target design has several other attractive features: a low target fabrication cost through the use of a few simple target materials; the potential for a modest-size 300 MWe power plant the target's physical strength to withstand the acceleration into the chamber and a high infrared albedo to better protect the target from preheating during the injection into the chamber.
DTIC
High Gain; Laser Fusion; Targets

20080041113 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Modulation Response of Twin Optically Coupled Diode Lasers

Golden, Eric M; Mar 27, 2008; 89 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483257; AFIT/GAP/ENP/08-M05; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483257

The modulation response of twin optically coupled diode lasers is investigated by modeling the dynamics of the system with a set of single mode rate equations. Steady states of the system are derived analytically or calculated numerically when an analytic expression is not easily available. The stability of the steady states is examined by using a linear stability analysis, which is also used in an algorithm that calculates the infinitesimal modulation response. The modulation response is also calculated by using a numerical method that directly integrates the rate equations. Typical parameters for an InGaAsP diode laser are used in the algorithms to investigate mutual coupling and evanescent coupling. It is discovered that mutually coupled lasers can be effectively modulated out to frequencies of approximately 9GHz compared to 4GHz for a solitary laser. Large regions of the parameter space for evanescent coupling produce unstable steady states, but this is remedied by introducing asymmetric DC currents through the lasers or by introducing the effects of gain saturation. With stable steady states, evanescently coupled lasers can be effectively modulated at frequencies out to about 30 GHz which is more than a seven fold improvement over a solitary laser.

DTIC

Modulation; Semiconductor Lasers

20080041114 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Laser-Induced Fluorescence and Performance Analysis of the Ultra-Compact Combustor

Lakusta, Patrick J; Jun 2008; 169 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483258; AFIT/GAE/ENY/08-J03; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483258

The AFIT Combustion Optimization and Analysis Laser (COAL) lab?s modular design and precision diagnostic systems make it an important facility for analying combustion processes. The objectives of this research are to install lab enhancements, validate the laser diagnostic system, characterize the igniter for AFIT?s Ultra-Compact Combustor (UCC) sections, and perform a laser diagnostic, performance, and video analysis of a flat-cavity UCC section. Laser system validation was accomplished using OH Planar Laser-Induced Fluorescence (PLIF) in a laminar hydrogen-air flame produced by a Hencken burner. Results are compared to previous research. Ratios of intensities and excitation scans in the OH (A-X) (1-0) electronic transition system are used to measure temperature and species concentrations. Igniter characterization was accomplished using open-air flammability and flame height observations to select an operating condition and validated by attaching the igniter to the UCC section. An operating procedure is recommended. A PLIF flame location study using quartz windows on the combustor was performed in the cavity-vane area. Performance measurements and video footage were acquired in order to analyze the system. Results are compared to previous experimental and CFD research. Future work will include two-color PLIF and other laser studies of different locations inside flat- and curved-cavity UCC sections.

DTIC

Combustion; Combustion Chambers; Diagnosis; Laser Induced Fluorescence; Lasers; Reliability Analysis

20080041115 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Demonstration of a Strategy to Perform Two-Dimensional Diode Laser Tomography

Givens, Ryan N; Mar 2008; 119 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483259; AFIT/GAP/ENP/08-M04; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483259

Demonstration of a strategy to perform two-dimensional diode laser tomography using a prior knowledge from symmetry arguments and computational fluid dynamic (CFD) calculations is presented for a flat flame burner. The strategy uses an optimization technique to determine flame diameter and location using a vector quantization approach. Next, the variance in a training set, produced from CFD calculations, is captured using principal components analysis. The information in the training set allows interpolation between beam paths resulting in temperature and density maps. Finally, the TDLAS temperature and density maps are shown to agree with traditional thermocouple measurements of the flat flame burner to

within five percent. Preliminary tomography results using the same strategy are then presented for a super-sonic flow through an isolator, a length of wind tunnel necessary to keep the shock wave produced by the combustor from reaching the inlet.
DTIC
Diodes; Lasers; Semiconductor Lasers; Tomography

20080041127 Actinix Scotts, Valley, CA USA
Long Coherence Length 193 nm Laser for High-Resolution Nano-Fabrication
Jacob, James J; Jun 27, 2008; 53 pp.; In English
Contract(s)/Grant(s): W31P4Q-07-C-0262; ARPA ORDER-AD63-42
Report No.(s): AD-A483286; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483286

Immersion lithography using available 193 nm optics and laser sources provides an attractive near-term path to reducing the printable feature sizes of integrated circuits by using a high-index fluid to reduce the wavelength at the wafer, rather than using light with higher photon energy and shorter vacuum wavelength. An interferometric immersion lithography (IIL) tool has demonstrated rapid fabrication of grating structures with half-pitches of 35 nm over exposure areas of 0.5 mm. This Phase I project has resulted in the design of a high power, sub-200 nm solid-state light source with very high spatial -- and temporal -- coherence to allow uniform high-contrast intensity fringes (<30 nm HP) to illuminate a wafer surface over a substantially larger exposure area, on the order of a 22 x 33 nun exposure site. In addition, the laser will have high power stability and be sufficiently robust to allow extended periods of operation with little maintenance or operator intervention.
DTIC
Fabrication; High Resolution; Lasers; Ultraviolet Lasers

20080041140 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Modeling of SBS Phase Conjugation in Multimode Step Index Fibers
Spring, Justin B; Mar 2008; 106 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483316; AFIT/GAP/ENP/08-M09; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483316

Stimulated Brillouin scattering in a multimode step-index fiber can be used to generate a counter-propagating, phase-conjugate beam that would prove useful in applications such as near diffraction limited, double-pass high-power amplifiers or coherent beam combination. Little modeling of such a fiber-based phase-conjugator has been done, making it difficult to make decisions about the right fiber to use. A numerical model was constructed with the aim of providing educated predictions about the phase conjugate fidelity that could be expected from a given pump intensity input coupled into a specific fiber. A numerical perturbation algorithm was constructed to search for the Stokes modal arrangement with the highest gain for a given pump input. The gain was calculated from the differential equation for the Stokes power assuming that all pump/Stokes modes decay/grow at the same rate, and that the fiber was lossless. The model proves to be much more accurate in predicting experimentally observed phase conjugate fidelities than previous efforts. In addition, the phenomenon of beam cleanup to higher order fiber modes is predicted and explained.
DTIC
Fiber Optics; Laser Beams; Models; Phase Conjugation

20080041154 Science Applications International Corp., McLean, VA USA
Direct Observation of Mass Oscillations due to Ablative Richtmyer-Meshkov Instability and Feedout in Planar Plastic Targets
Aglitskiy, Y; Velikovich, A L; Karasik, M; Serlin, V; Pawley, C J; Schmitt, A J; Obenschain, S P; Mostovych, A N; Gardner, J H; Metzler, N; May 2002; 46 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483364; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483364

Perturbations that seed Rayleigh-Taylor (RT) instability in laser-driven targets form during the early-time period. This time includes a shock wave transit from the front to the rear surface of the target, and a rarefaction wave transit in the opposite direction. During this time interval, areal mass perturbations caused by all sources of nonuniformity (laser imprint, surface ripple) are expected to oscillate. The first direct experimental observations of the areal mass oscillations due to ablative Richtmyer-Meshkov (RM) instability and feedout followed by the RT growth of areal mass modulation are discussed. The

experiments were made with 40 to 99 mm thick planar plastic targets rippled either on the front or on the rear with a sine wave ripple with either 30 or 45 mm wavelength and with 0.5, 1 or 1.5 mm amplitude. Targets were irradiated with 4 ns long Nike KrF laser pulses at approximately 50 TW/cm2. The oscillations were observed with our novel diagnostic technique, a monochromatic x-ray imager coupled to a streak camera. For the ablative RM instability (front side ripple), the mass modulation amplitude was typically observed to grow, reach a peak, and then decrease, after which the exponential RT growth started. In some cases, one phase reversal due to the ablative RM instability was observed. For the feedout geometry (rear side ripple), in all cases two phase reversals were observed: a distinct half-oscillation was followed by the onset of the RT growth, resulting in a second phase reversal.
DTIC
Ablation; Laser Beams; Observation; Oscillations; Perturbation; Stability; Targets

20080041155 Naval Research Lab., Washington, DC USA
Large-Scale High-Resolution Simulations of High Gain Direct-Drive Inertial Confinement Fusion Targets
Schmitt, Andrew J; Colombant, D G; Velikovich, A L; Zalesak, S T; Gardner, J H; Fyfe, D E; Metzler, N; May 2004; 8 pp.; In English
Report No.(s): AD-A483365; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483365

Targets have been designed that produce moderate to high gain when directly driven by lasers. The intrinsic sensitivity of these targets to hydro instabilities is found using the FAST(2D) multidimensional radiation hydrocode [J.H. Gardner, A.J. Schmitt, J.P. Dahlburg, et al., Phys. Plasmas 5, 1935 (1998)], which simulates the simultaneous behavior of a large bandwidth (e.g., l = 2-256) of perturbations from compression to acceleration, and then to stagnation and burn. The development of the structure in these multi-mode simulations is benchmarked to theoretical analysis and single-mode calculations, which reveals the need to 'renormalize' the simulation after compression. The simulations predict that a direct drive point design is expected to degrade significantly from its 1-D clean yield, yet still ignite and give appreciable gain. Simulations of high-gain pellets using a spike prepulse to inhibit Richtmyer-Meshkov growth show a considerable robustness, with high (> 100) gains possible even with nominal surface finishes and laser imprint.
DTIC
Drives; High Gain; High Resolution; Implosions; Inertial Confinement Fusion; Mechanical Drives; Simulation; Targets

20080041160 Nuclear Research Center, Beer-Sheva, Israel
Reduction of Early-Time Perturbation Growth in Ablatively Driven Laser Targets Using Tailored Density Profiles
Metzler, Nathan; Velikovich, Alexander L; Gardner, John H; Jan 1999; 31 pp.; In English
Report No.(s): AD-A483379; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483379

We investigate analytically and numerically the effects of tailoring the density profile in a laser target in order to decrease imprinting of mass perturbations due to the long-wavelength modes. Inverting the acceleration of the ablation front during the shock transit time could reduce the early-time mass perturbation amplitudes developed in the target after the shock transit. This principle was first suggested for mitigating the RT instability of imploding Z-pinches [Velikovich et al., Phys. Rev. Lett. 77, 853 (1996); Phys. Plasmas 5, 3377 (1998)]. As the shock wave slows down propagating into higher density layers, the effective gravity near the ablation front has the same direction as the density gradient. This makes the mass perturbations near it oscillate at a higher frequency and at a lower amplitude than they normally would due to the 'rocket effect' caused by mass ablation [Sanz, Phys. Rev. Lett. 73, 2700 (1994); Piriz et al., Phys. Plasmas 4, 1117 (1997)]. So, tailoring density profiles instead of using flat densities is demonstrated to reduce the 'seed' mass perturbation amplitude at the onset of the exponential RT growth.
DTIC
Ablative Materials; Laser Plasmas; Laser Targets; Perturbation

20080041258 Naval Postgraduate School, Monterey, CA USA
Investigation of the Acoustic Source Characteristics of High Energy Laser Pulses: Models and Experiment
McGhee, Jason R; Jun 2008; 87 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483488; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This thesis was motivated by the possibility of using high energy laser pulses as an acoustic source for naval applications. Research conducted in the 1970's and 80's shows that sound production from laser pulses is most efficient when the energy density of the pulse exceeds the threshold required for plasma formation. The resulting acoustic wave falls into the highly

non-linear shock regime. Later work by Vogel et al. sought a more complete understanding of the non-linear dynamics and energy distribution of this process in an attempt to limit collateral tissue damage during laser surgery. This work includes detailed experimental data including photographs and hydrophone measurements as well as numerical calculations of expected pressures, bubble dynamics, and pulse shapes. The goal of this thesis was to investigate the characteristics of the laser generated acoustic pulse further through experimentation and modeling. Experiments were carried out with Ted Jones at the Naval Research Laboratory to investigate the directionality of the acoustic pulse produced by a 100fs 2mJ laser pulse focused just under the surface of water. The range dependence of the pressure amplitude was also examined. The amplitude of the pulse was found to vary with direction; however, this effect is considered likely to be a result of interference between the direct path and the surface reflection. A linear least-squares fit of the peak pressure amplitude with range revealed a 1/r1.2 relationship. This is consistent with the expected approximately 1/r relationship for pressure amplitudes under 100MPa. The modeling effort employed AUTODYN, a finite element program designed to handle the non-linear processes in explosions. The laser generated acoustic source was modeled using an explosive of the same volume as the laser spot reported by Vogel for his 10mJ 6ns pulse. The internal energy of the explosive was adjusted until the pressure amplitudes agreed with Vogel's measured values.
DTIC
High Power Lasers; Pulsed Lasers; Sound Generators; Sound Waves

20080041319 Naval Postgraduate School, Monterey, CA USA
Real-Time Terahertz Imaging Using a Quantum Cascade Laser and Uncooled Microbolometer Focal Plane Array
Behnken, Barry N; Jun 2008; 101 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483639; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Real-time imaging in the terahertz (THz) spectral range was achieved using an uncooled, 160 120 pixel infrared microbolometer camera and a milliwatt-scale quantum cascade laser (QCL). By replacing the camera's original focusing optics with a Tsurupica-based lens and minimizing diffraction effects incurred by the QCL output beam, an imaging scheme was developed in which the camera's focal plane array successfully detected wavelengths that are more than an order of magnitude longer than those for which the system is designed. Moreover, the incorporation of parabolic reflecting optics yielded a capability to produce high-resolution images of objects placed within the beam path. Despite the low laser powers employed, this scheme allows high-contrast imaging of various objects concealed by a wide range of nonmetallic materials confirming the suitability of this technology for homeland security screening applications. Furthermore, the identification of relatively obscure security features in British currency notes suggests that Terahertz imaging could serve a future role as a detection mechanism against assorted counterfeiting practices. An extensive comparative analysis of experimental data produced using two QCLs (resonating at 2.8 and 3.6 THz) provides additional insight into the physics underlying these results, and suggests methods by which this imaging technology could be further improved.
DTIC
Bolometers; Focal Plane Devices; Imaging Techniques; Lasers; Quantum Cascade Lasers; Real Time Operation

20080041354 Brown Univ., Providence, RI USA
Silicon Nanostructures, Excitonic Interactions, Laser Consequences
Xu, Jimmy; Jul 11, 2008; 7 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-05-1-0181; Proj-08PR00395-00
Report No.(s): AD-A483738; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Optically pumped laser emission is achieved at cryogenic temperatures (<85K) on carbon-implanted nano-patterned silicon-on-insulator. By using ion-implantation and solid-phase-epitaxy for recrystallization, a 30x improvement in the luminescence intensity of silicon is reported. Nano-patterning was achieved though reactive-ion-etching using an anodized aluminum oxide membrane as mask. The results described here lay a solid foundation for the next phase of development aimed at achieving room-temperature lasing in silicon.
DTIC
Excitons; Lasers; Nanostructures (Devices); Silicon

20080041482 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Measuring the Dispersion in Laser Cavity Mirrors using White-Light Interferometry

Goodspeed, Allison S; Mar 2008; 76 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483325; AFIT/GAP/ENP/08-M06; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483325

Terahertz radiation is an emerging field that has far reaching applications. There is a need for portable and affordable terahertz sources that may be used for detection of structural weaknesses in aerospace composites. One possibility for terahertz generation is a femtosecond Cr:LiSAF laser. However, controlling intracavity dispersion is necessary in order to get the ultrashort pulses needed to generate terahertz radiation. This research measures dispersion of the chirped femtosecond intracavity mirrors by employing white-light interferometry and explains the theory behind the curve-fitting process used to calculate dispersion. To compensate for the narrow reflectivity band of the mirrors, a CaF2 (calcium fluoride) window was used to increase the number of spectral fringes in the interferogram. A cavity was designed using these mirrors, and the Cr:LiSAF laser was successfully modelocked.

DTIC

Interferometry; Laser Cavities; Laser Mode Locking; Mirrors

20080041648 Peking Univ., China

Optical Lattice Laser

Chen, Jingbiao; Chen, Xuzong; Jan 2005; 4 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483850; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483850

Atoms with narrow-linewidth transition trapped within the Lamb-Dick regime of optical lattice are proposed be used as laser gain medium to build a laser. The gain medium atoms can be the alkaline-earth species, Magnesium, Calcium, and Strontium, including Ytterbium. These atoms possess promising super-narrow optical clock transitions, but here, this clock transition is proposed to be used as the lasing transition of the output laser. This optical lattice laser with expected super-narrow linewidth will be an active optical clock with high accuracy and stability.

DTIC

Clocks; Lasers; Masers

20080041906 Naval Observatory, Washington, DC USA

Miniaturized Atomic Fountain Optical Table

Crane, Scott; Peil, Steven; Ekstrom, Christopher R; Aug 2005; 4 pp.; In English

Report No.(s): AD-A484401; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Using commercially available components at a cost comparable to conventional free-space optics, we have built a miniaturized version of the optical setup for an atomic fountain that fits onto a 40 cm by 55 cm rack-mounted breadboard. With this system, light from an input fiber is split into ten fiber-coupled output beams: two frequency-tunable sets of three collection/launching beams, beams for repumping and detection, and two diagnostic beams. The output fibers deliver the laser light to integrated optical couplers that bolt directly to the atomic-fountain vacuum chamber [1]. Approximately 30% of the light from the input fiber is available for the experiment.

DTIC

Atoms; Laser Beams; Miniaturization; Optical Properties

20080042013 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Characterizing Effects and Benefits of Beam Defocus on High Energy Laser Performance Under Thermal Blooming and Turbulence Conditions for Air-to-Ground Engagements

Long, Scott N; Apr 29, 2008; 167 pp.; In English

Report No.(s): AD-A483289; AFIT/DS/ENS/08-05; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483289

This dissertation makes contributions towards knowledge of optimizing of laser weapon performance when operating in the air-to-ground (ATG) regime in thermal blooming conditions. Wave optics modeling techniques were used to represent laser weapon performance in a high fidelity sense to allow progress to be made toward improving lower-fidelity scaling laws that can be used in systems level analysis which has need for better representations of thermal blooming. Chemical-oxygen iodine

laser (COIL) based weapon systems that operate near the ground will experience thermal blooming due to atmospheric absorption if output power is sufficiently high. The thermal lens in the ATG case is predominantly in the far-field of the optical system which puts the problem outside the envelope for most classical phase correction techniques. Focusing the laser beyond the target (defocus) in the air-to-ground regime is shown to improve irradiance at the target and can be thought of as reducing the thermal blooming distortion number, ND, rather than phase correction. Improvement is shown in a baseline scenario presented and all variations from it explored herein. The Breaux ND is examined for potential use in a defocus scaling law, and a correction factor due to Smith (1977), developed for a different context, is proposed to address deficiencies. Optimal defocus settings and expected improvement are presented as a function of Breaux ND. Also, the generally negative interaction between turbulence and thermal blooming is investigated and shown to further limit performance potential of ATG laser weapons. This negative interaction can impact the weapon design trade space and operational methods for minimizing the interaction and thermal blooming are explored in a case study.
DTIC
Air to Surface Missiles; Defocusing; High Power Lasers; Laser Outputs; Laser Weapons; Thermal Blooming; Turbulence

20080042031 Air Force Research Lab., Kirkland AFB, NM USA
Development of Numerical Simulation Methods for Analysis of Laser Guided Arc Discharge
Page, William; Fisk, Brian; Zimmerman, William; Feb 29, 2008; 46 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-3151
Report No.(s): AD-A483304; AFRL-RD-PS-TR-2008-1041; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483304

Modeling of the Use of USP laser pre-ionization as a guide path for a high voltage discharge in air was addressed. The physical processes involved are complex and span many orders of magnitude in the temporal and spatial resolution that must be considered. A two dimensional simulation model was produced that treats the problem in different time regimes with suitable approximations. The theoretical models and numerical models developed are described along with some test calculations. The simulations were done on a single CPU PC workstation. Procedures were outlined for porting the simulation to a multi-node high performance computer.
DTIC
Arc Discharges; Laser Guidance; Laser Outputs

20080042305 NASA Langley Research Center, Hampton, VA, USA
Development and Evaluation of a High Sensitivity DIAL System for Profiling Atmospheric CO2
Ismail, Syed; Koch, Grady J.; Refaat, Tamer F.; Abedin, M. N.; Yu, Jirong; Singh, Upendra N.; October 14, 2008; 1 pp.; In English; International Conference on Space Optics 2008, 14-17 Oct. 2008, Toulose, France
Contract(s)/Grant(s): WBS 478643.02.05.04.07; Copyright; Avail.: Other Sources; Abstract Only

A ground-based 2-micron Differential Absorption Lidar (DIAL) CO2 profiling system for atmospheric boundary layer studies and validation of space-based CO2 sensors is being developed and tested at NASA Langley Research Center as part of the NASA Instrument Incubator Program. To capture the variability of CO2 in the lower troposphere a precision of 1-2 ppm of CO2 (less than 0.5%) with 0.5 to 1 km vertical resolution from near surface to free troposphere (4-5 km) is one of the goals of this program. In addition, a 1% (3 ppm) absolute accuracy with a 1 km resolution over 0.5 km to free troposphere (4-5 km) is also a goal of the program. This DIAL system leverages 2-micron laser technology developed under NASA's Laser Risk Reduction Program (LRRP) and other NASA programs to develop new solid-state laser technology that provides high pulse energy, tunable, wavelength-stabilized, and double-pulsed lasers that are operable over pre-selected temperature insensitive strong CO2 absorption lines suitable for profiling of lower tropospheric CO2. It also incorporates new high quantum efficiency, high gain, and relatively low noise phototransistors, and a new receiver/signal processor system to achieve high precision DIAL measurements. This presentation describes the capabilities of this system for atmospheric CO2 and aerosol profiling. Examples of atmospheric measurements in the lidar and DIAL mode will be presented.
Author
Differential Absorption Lidar; Laser Applications; Radar Measurement; Pulsed Lasers; Systems Engineering; Receivers; Signal Processing; Phototransistors; Sensors

37
MECHANICAL ENGINEERING

Includes mechanical devices and equipment; machine elements and processes. For cases where the application of a device or the host vehicle is emphasized see also the specific category where the application or vehicle is treated. For robotics see *63 Cybernetics, Artificial Intelligence, and Robotics*; and *54 Man/System Technology and Life Support*.

20080040926 Kushman (Brooks), PC, Southfield, MI, USA
Method for Controlling Engine Air/Fuel Ratio
Bolton, B. K., Inventor; Sisken, K. D., Inventor; Grosmougin, A. L., Inventor; 12 Jan 05; 6 pp.; In English
Contract(s)/Grant(s): DE-FC02-99EE50575
Patent Info.: Filed Filed 12 Jan 05; US-Patent-Appl-SN-11-033 770
Report No.(s): PB2008-103723; No Copyright; Avail.: CASI: A02, Hardcopy

A system for controlling engine air/fuel ratio includes an engine, a compressor having an inlet receiving air. The compressor discharges air to the engine intake. A recirculation path is provided from the compressor discharge to the compressor inlet. A controllable valve is located along the recirculation path. A controller is programmed to control the valve to vary the air flow to the engine intake, thereby controlling the air/fuel ratio. Various applications for the compressor recirculation arrangement are possible.
NTIS
Air Flow; Diesel Engines; Fuel-Air Ratio; Patent Applications

20080040938
Closed Loop Engine Control for Regulating NOx Emissions, Using a Two-Dimensional Fuel-Air Curve
Bourn, G. D., Inventor; Smith, J. A., Inventor; Gingrich, J. W., Inventor; 27 Sep 05; 7 pp.; In English
Contract(s)/Grant(s): DE-FC26-03NT41859
Patent Info.: Filed Filed 27 Sep 05; US-Patent-Appl-SN-11-237 409
Report No.(s): PB2008-103814; No Copyright; Avail.: CASI: A02, Hardcopy

An engine control strategy that ensures that NOx emissions from the engine will be maintained at an acceptable level. The control strategy is based on a two-dimensional fuel-air curve, in which air manifold pressure (AMP) is a function of fuel header pressure and engine speed. The control strategy provides for closed loop NOx adjustment to a base AMP value derived from the fuel-air curve.
NTIS
Engine Control; Feedback Control; Internal Combustion Engines; Nitrogen Oxides; Patent Applications

20080042132 General Electric Co., Schenectady, NY, USA
21st Century Locomotive Technology: Quarterly Technical Status Report 18 DOE/AL68284 TSR18
Salasoo, L.; Topinka, J.; Aug. 21, 2007; 4 pp.; In English
Contract(s)/Grant(s): DE-FC04-02AL68284
Report No.(s): DE2007-912850; DOE-68284-TSR18; No Copyright; Avail.: Department of Energy Information Bridge

Nozzle optimization for a new piston bowl design is reported, covering several geometrical features. The influence of fuel sulfur level on PM emissions was investigated.
NTIS
Energy Storage; Fuel Injection; Internal Combustion Engines; Locomotives

20080042311 Ganz Law, PC, Hillsboro, OR, USA
Ring Generator (PAT-APPL-10-560 147)
Hofbauer, P., Inventor; McCleer, P., Inventor; 25 Jun 04; 20 pp.; In English
Contract(s)/Grant(s): DAAH01-03-C-R077
Patent Info.: Filed Filed 25 Jun 04; US-Patent-Appl-SN-10-560 147
Report No.(s): PB2008-103921; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention is a rotary device that may be adapted for use as a propeller assembly and electrical generator for aerial vehicles or other vehicles intended for fluid media. In one example, the device includes a ring assembly having a plurality of centrally linked blades coupled to a rotatable common hub. Rotary motion of the ring assembly is facilitated by

coupling it to an opposed cylinder, opposed piston, internal combustion. The ring assembly includes components of an electrical power generating system so that electrical power is produced from the rotation of the ring assembly.
NTIS
Electric Generators; Patent Applications

38
QUALITY ASSURANCE AND RELIABILITY

Includes approaches to, and methods for reliability analysis and control, quality control, inspection, maintainability, and standardization.

20080041546 NASA Goddard Space Flight Center, Greenbelt, MD, USA
High Temperature Life Testing of 80Ni-20Cr Wire in a Simulated Mars Atmosphere for the Sample Analysis at Mars (SAM) Instrument Suite Gas Processing System (GPS) Carbon Dioxide Scrubber
Hoffman, Christopher; Munoz, Bruno; Gundersen, Cynthia; Thomas, Walter, III; Stephenson, Timothy; Oct. 20, 2008; 11 pp.; In English; 25th Space Simulation Conference/Inst. of Environmental Sciences and Technology, 20-23 Oct.. 2008, Annapolis, MD, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

In support of the GPS for the SAM instrument suite built by NASA/GSFC, a life test facility was developed to test the suitability of 80Ni-20Cr alloy wire, 0.0142 cm diameter, for use as a heater element for the carbon dioxide scrubber. The element would be required to operate at 1000 C in order to attain the 800 C required for regeneration of the getter. The element also would need to operate in the Mars atmosphere, which consists mostly of CO2 at pressures between 4 and 12 torr. Data on the high temperature degradation mechanism of 80Ni- 20Cr in low pressure CO2, coupled with the effects of thermal cycling, were unknown. In addition, the influence of work hardening of the wire during assembly and the potential for catastrophic grain growth also were unknown. Verification of the element reliability as defined by the mission goals required the construction of a test facility that would accurately simulate the duty cycles in a simulated Mars atmosphere. The experimental set-up, along with the test protocol and results will be described.
Author
Global Positioning System; Carbon Dioxide; Mars Atmosphere; Thermal Cycling Tests; High Temperature; Heaters

20080041556 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Data Assimilation Experiments using Quality Controlled AIRS Version 5 Temperature Soundings
Susskind, Joel; January 20, 2008; 2 pp.; In English; American Meteorological Society Conference, 20-24 Jan. 2008, New Orleans, LA, USA; No Copyright; Avail.: Other Sources; Abstract Only

The AIRS Science Team Version 5 retrieval algorithm has been finalized and is now operational at the Goddard DAAC in the processing (and reprocessing) of all AIRS data. Version 5 contains accurate case-by-case error estimates for most derived products, which are also used for quality control. We have conducted forecast impact experiments assimilating AIRS quality controlled temperature profiles using the NASA GEOS-5 data assimilation system, consisting of the NCEP GSI analysis coupled with the NASA FVGCM. Assimilation of quality controlled temperature profiles resulted in significantly improved forecast skill in both the Northern Hemisphere and Southern Hemisphere Extra-Tropics, compared to that obtained from analyses obtained when all data used operationally by NCEP except for AIRS data is assimilated. Experiments using different Quality Control thresholds for assimilation of AIRS temperature retrievals showed that a medium quality control threshold performed better than a tighter threshold, which provided better overall sounding accuracy; or a looser threshold, which provided better spatial coverage of accepted soundings. We are conducting more experiments to further optimize this balance of spatial coverage and sounding accuracy from the data assimilation perspective. In all cases, temperature soundings were assimilated well below cloud level in partially cloudy cases. The positive impact of assimilating AIRS derived atmospheric temperatures all but vanished when only AIRS stratospheric temperatures were assimilated. Forecast skill resulting from assimilation of AIRS radiances uncontaminated by clouds, instead of AIRS temperature soundings, was only slightly better than that resulting from assimilation of only stratospheric AIRS temperatures. This reduction in forecast skill is most likely the result of significant loss of tropospheric information when only AIRS radiances unaffected by clouds are used in the data assimilation process.
Author
Data Systems; Airborne Integrated Reconnaissance System; Error Analysis; Quality Control; Temperature Profiles; Atmospheric Temperature; Atmospheric Sounding; Assimilation

39
STRUCTURAL MECHANICS

Includes structural element design, analysis and testing; dynamic responses of structures; weight analysis; fatigue and other structural properties; and mechanical and thermal stresses in structures. For applications see *05 Aircraft Design, Testing and Performance*; and *18 Spacecraft Design, Testing and Performance*.

20080040844 Federal Highway Administration, Washington, DC USA
Application of Ground Anchors and Soil Nails in Roadway Construction (on CD-ROM)
Apr. 2007; In English
Report No.(s): PB2008-500019; No Copyright; Avail.: National Technical Information Service (NTIS)

This product, 'Application of Ground Anchors and Soil Nails in Roadway Construction' includes five multimedia presentations that describe and explain the principles of science and engineering related to the construction of ground anchors and soil nail wall systems. The objective for the first module, Introduction to the inspection of Soil Nails and Ground Anchors, is to offer an introduction to drilled soil nails and ground anchor technologies, especially relating to installation, testing, and inspection. Recognizing the extensive knowledge base for these topics, this module forms the prerequisite to the advanced topics offered in the second and third modules. The two advanced modules are in alignment with existing FHWA reports and permit more digital features to be introduced to enhance learning. The Inspection of Soil Nail Walls module includes metric conversion screens and very extensive features for viewers with disabilities. Interactive animation, video, practice exercises, and checklists are provided throughout the module, summarizing key items discussed in the text. Printable blank forms and checklists are included via web browser access in the contract documentation section. These forms are used by the inspector during the construction inspection process to record important data concerning the installation and testing of either the ground anchors or soil nails. Of special significance and digital complexity are the comprehensive corrosion protection schematic sequences detailing current design and construction practice for Bar and Multi-Strand tendons, under both Class 1 and Class 2 protection.
NTIS
Anchors (Fasteners); CD-ROM; Construction; Roads; Soils

20080041026 Leffert Jay and Polglaze, PA, Minneapolis, MN, USA
Vibration Control By Confinement of Vibration Energy
Allaei, D., Inventor; 8 Feb 05; 27 pp.; In English
Contract(s)/Grant(s): DAAH01-94C-R001
Patent Info.: Filed Filed 8 Feb 05; US-Patent-Appl-SN-11-053 248
Report No.(s): PB2008-103805; No Copyright; Avail.: CASI: A03, Hardcopy

Effective first translational and first torsional forces are passively applied to a vibrating member at a preselected location of the vibrating member. Vibrations in the vibrating member are sensed. Effective second translational and second torsional forces are actively applied to the vibrating member in response to the sensed vibrations. The passively applied effective first translational and first torsional forces and actively applied effective second translational and second torsional forces act to substantially confine vibration energy to a preselected region of the vibrating member.
NTIS
Confinement; Patent Applications; Torsion; Vibration; Vibration Damping

20080041125 General Accounting Office, Washington, DC USA
MILITARY CONSTRUCTION: Kaiserslautern Military Community Center Project Continues to Experience Problems
Kutz, Gregory D; Causseaux, Bruce A; Dorn, Terrell G; Jun 25, 2008; 31 pp.; In English
Report No.(s): AD-A483277; GAO-08-923T; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483277

The Kaiserslautern Military Community Center (KMCC) is one of many projects initiated at Ramstein Air Base to upgrade capabilities of the base as a result of the consolidation of military bases in Europe. The KMCC is intended to provide lodging, dining, shopping, and entertainment for thousands of U.S. military and civilian personnel and their families in the area. Construction on the project, which began in late 2003, was originally scheduled to be completed in early 2006. On June 28, 2007, GAO testified that construction deficiencies and mismanagement had drawn into question when the project would be completed and at what cost. This testimony discusses updated findings related to the KMCC project. The testimony describes (1) the current status of the KMCC construction project, (2) whether oversight and internal control improvements

have been made by the Air Force since GAO's last testimony, and (3) if other projects recently completed in the KMCC area have experienced problems similar to those affecting the KMCC.
DTIC
Construction; Military Air Facilities

20080041857 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Mining Association Rules Between Credits in the Leadership in Energy and Environmental Design for New Construction (LEED-NC) Green Building Assessment System
Thomas, Benjamin J; Mar 2008; 109 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484263; AFIT/GEM/ENV/08-M19; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Leadership in Energy and Environmental Design (LEED) Building Assessment System is a performance-based tool for determining the environmental impact of a facility from the whole-building perspective. Taking this vision into account, the individual credits that comprise LEED are designed to reward design teams for employing sustainable design strategies that reduce the total environmental impact across several sustainability issues. This study analyzed projects that have been certified in LEED for New Construction (LEED-NC) versions 2.0 and 2.1. Data on the credits achieved by the projects were mined using the Apriori algorithm which produced 641 association rules. These results were then subjectively reduced to the 24 most synergistic credit combinations and were subsequently identified as credit bundles. This study provided insight into credit interplay and its effect on high-scoring sustainable design strategies. Additionally, it shows that no one strategy is systematically employed by sustainable design professionals in the pursuit of LEED certification. This research lays the foundation for the application of data mining techniques to future LEED data sets. Finally, the revealed credit bundles support the assertion that LEED is a tool that rewards whole-building design and reinforces the perception that integrated design teams are a critical element in successful LEED project delivery.
DTIC
Buildings; Construction; Data Mining; Environmental Surveys; Leadership; Scoring

20080042011 Westinghouse Savannah River Co., Aiken, SC, USA
Spent Fuel Cask Impact Limiter Attachment Design Deficiencies
Leduc, J. R.; England, J. W.; Oct. 2007; 9 pp.; In English
Contract(s)/Grant(s): DE-AC09-96SR18500
Report No.(s): DE2007-918145; No Copyright; Avail.: National Technical Information Service (NTIS)

A recent structural analysis of the T-3 Spent Fuel Containment Cask found problems with the design of the attachment system. Assumptions in the original SARP concerning the loading in the attachment bolts were found to be inaccurate in certain drop orientations. Similar weaknesses in the attachment system designs of other casks were also noted. This paper documents the lessons learned and their applicability to impact limiter attachment system designs.
NTIS
Barrels (Containers); Defects; Spent Fuels

42
GEOSCIENCES (GENERAL)

Includes general research topics related to the Earth sciences, and the specific areas of petrology, mineralogy, and general geology. For other specific topics in geosciences see *categories 42 through 48*.

20080042381 NASA Johnson Space Center, Houston, TX, USA
Provenance of Sulfate-Rich Sediments at Terra Meridiani through Paleo-Polar Weathering
Niles, Paul B.; Michalski, Joseph; [2008]; 28 pp.; In English; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

The chemistry, sedimentology, and geology of the Meridiani sedimentary deposits are best explained by eolian reworking of the sublimation residue of a large scale ice/dust deposit. Remote sensing studies have linked the Meridiani deposits to a number of other geologic regions on Mars through mineralogic similarities, geomorphic similarities, and regional associations. The common properties shared by these deposits suggest that they share a common formation process which must have acted

over a large area of Mars. The action of large-scale ice deposits on Mars through polar wander or obliquity variations provides a mechanism for volatile transport on Mars without invoking an early greenhouse. This also provides a common formation mechanism for many of the sulfate minerals and layered deposits on Mars, which explains their common occurrence.
Author
Sedimentary Rocks; Planetary Geology; Remote Sensing; Geomorphology; Deposits; Mineralogy; Mars Surface

20080042399 California Univ., Santa Barbara, CA, USA
A VARI-Based Relative Greenness from MODIS Data for Computing the Fire Potential Index
Schneider, P.; Roberts, D. A.; Kyriakidis, P. C.; Remote Sensing of Environment; March 18, 2008; ISSN 0034-4257; Volume 112, Issue 3, pp. 1151-1167; In English; Original contains black and white illustrations
Contract(s)/Grant(s): NNG04GQ77H; Copyright; Avail.: Other Sources
ONLINE: http://dx.doi.org/10.1016/j.rse.2007.07.010

The Fire Potential Index (FPI) relies on relative greenness (RG) estimates from remote sensing data. The Normalized Difference Vegetation index (NDVI), derived from NOAA Advanced Very High Resolution Radiometer (AVHRR) imagery is currently used to calculate RG operationally. Here we evaluated an alternate measure of RG using the Visible Atmospheric Resistant Index (VARI) derived from Moderate Resolution Imaging Spectrometer (MODIS) data. VARI was chosen because it has previously been shown to have the strongest relationship with Live Fuel Moisture (LFM) out of a wide selection of MODIS-derived indices in southern California shrublands. To compare MODIS-based NDVI-FPI and VARI-FPI, RG was calculated from a 6-year time series of MODIS composites and validated against in-situ observations of LFM as a surrogate for vegetation greenness. RG from both indices was then compared in terms of its performance for computing the FPI using historical wildfire data. Computed RG values were regressed against ground-sampled LFM at 14 sites within Los Angeles County. The results indicate the VARI-based RG consistently shows a stronger relationship with observed LFM than NDVI-based RG. With an average R2 of 0.727 compared to a value of only 0.622 for NDVI-RG, VARI-RG showed stronger relationships at 13 out of 14 sites. Based on these results, daily FPI maps were computed for the years 2001 through 2005 using both NDVI-RG and VARI-RG. These were then validated against 12,490 fire detections from the MODIS active fire product using logistic regression. Deviance of the logistic regression model was 408.8 for NDVI-FPI and 176.2 for VARI-FPI. The c-index was found to be 0.69 and 0.78, respectively. The results show that VARI-FP outperforms NDVI-FPI in distinguishing between fire and no-fire events for historical wildfire data in southern California for the given time period.
Author
Vegetation; Moisture Content; Remote Sensing; Fires; Risk Assessment; MODIS (Radiometry); Image Analysis

43
EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth features, phenomena and resources by aircraft, balloon, rocket, and spacecraft; analysis of remote sensing data and imagery; development of remote sensing products; photogrammetry; and aerial photography. For related instrumentation see *35 Instrumentation and Photography*.

20080040869 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Accessing, Utilizing and Visualizing NASA Remote Sensing Data for Malaria Modeling and Surveillance
Kiang, Richard K.; Adimi, Farida; Kempler, Steven; December 03, 2007; 2 pp.; In English; Mekong Malaria Colloquium, 3-5 Dec. 2007, Hanoi, Viet Nam; Original contains black and white illustrations; No Copyright; Avail.: CASI: A01, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080040869

This poster presentation reviews the use of NASA remote sensing data that can be used to extract environmental information for modeling malaria transmission. The authors discuss the remote sensing data from Landsat, Advanced Very High Resolution Radiometer (AVHRR), Moderate Resolution Imaging Spectroradiometer (MODIS), Tropical Rainfall Measuring Mission (TRMM), Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), Earth Observing One (EO-1), Advanced Land Imager (ALI) and Seasonal to Interannual Earth Science Information Partner (SIESIP) dataset.
CASI
Earth Sciences; Environment Models; Parasitic Diseases; Remote Sensing; Data Products; Tropical Regions

20080040873 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Exploring and Visualizing A-Train Instrument Data

Kempler, S.; Leptoukh, G.; Berrick, S.; Stephens, G.; Winker, D.; Reinke, D.; October 22, 2007; 2 pp.; In English; A-Train Lille 07 Symposium, 22 - 26 Oct. 2007, Lille, France; Original contains poor quality, truncated or crooked pages; Copyright; Avail.: CASI: A01, Hardcopy

The succession of US and international satellites that follow each other in close succession, known as the A-Train, affords an opportunity to atmospheric researchers that no single platform could provide: Increasing the number of observations at any given geographic location.. . a more complete 'virtual science platform'. However, vertically and horizontally, co-registering and regridding datasets from independently developed missions, Aqua, Calipso, Cloudsat, Parasol, and Aura, so that they can be inter-compared can be daunting to some, and may be repeated by many. Scientists will individually spend much of their time and resources acquiring A-Train datasets of interest residing at various locations, developing algorithms to match up and graph datasets along the A-Train track, and search through large amounts of data for areas and/or phenomena of interest. The aggregate amount of effort that can be expended on repeating pre-science tasks could climb into the tens of millions of dollars. The goal of the A-Train Data Depot (ATDD) is to enable free movement of remotely located A-Train data so that they are combined to create a consolidated vertical view of the Earth's Atmosphere along the A-Train tracks. The innovative approach of analyzing and visualizing atmospheric profiles along the platforms track (i.e., time) is accomplished by through the ATDDs Giovanni data analysis and visualization tool. Giovanni brings together data from Aqua (MODIS, AIRS, AMSR-E), Cloudsat (cloud profiling radar) and Calipso (CALIOP, IIR), as well as the Aura (OMI, MLS, HIRDLS, TES) to create a consolidated vertical view of the Earth's Atmosphere along the A-Train tracks. This easy to learn and use exploration tool will allow users to create vertical profiles of any desired A-Train dataset, for any given time of choice. This presentation shows the power of Giovanni by describing and illustrating how this tool facilitates and aids A-Train science and research. A web based display system Giovanni provides users with the capability of creating co-located profile images of temperature and humidity data from the MODIS, MLS and AIRS instruments for a user specified time and spatial area. In addition, Cloud and Aerosol profiles may also be displayed for the Cloudsat and Caliop instruments. The ability to modify horizontal and vertical axis range, data range and dynamic color range is also provided. Two dimensional strip plots of MODIS, AIRS, OM1 and POLDER parameters, co-located along the Cloudsat reference track, can also be plotted along with the Cloudsat cloud profiling data. Center swath pixels for the same parameters can also be shown as line plots overlaying the Cloudsat or Calipso profile images. Images and subsetted data produced in each analysis run may be downloaded. Users truly can explore and discover data specific to their needs prior to ever transferring data to their analysis tools.

Author

Artificial Satellites; Satellite Instruments; Scientific Visualization; Data Processing; Remote Sensing; Satellite Observation

20080041056 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Simulation of Malaria Transmission among Households in a Thai Village using Remotely Sensed Parameters

Kiang, Richard K.; Adimi, Farida; Zollner, Gabriela E.; Coleman, Russell E.; November 04, 2007; 2 pp.; In English; ASTMH Annual Meeting, 4-8 Nov. 2007, Philadelphia, PA, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: A01, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080041056

We have used discrete-event simulation to model the malaria transmission in a Thailand village with approximately 700 residents. Specifically, we model the detailed interactions among the vector life cycle, sporogonic cycle and human infection cycle under the explicit influences of selected extrinsic and intrinsic factors. Some of the meteorological and environmental parameters used in the simulation are derived from Tropical Rainfall Measuring Mission and the Ikonos satellite data. Parameters used in the simulations reflect the realistic condition of the village, including the locations and sizes of the households, ages and estimated immunity of the residents, presence of farm animals, and locations of larval habitats. Larval habitats include the actual locations where larvae were collected and the probable locations based on satellite data. The output of the simulation includes the individual infection status and the quantities normally observed in field studies, such as mosquito biting rates, sporozoite infection rates, gametocyte prevalence and incidence. Simulated transmission under homogeneous environmental condition was compared with that predicted by a SEIR model. Sensitivity of the output with respect to some extrinsic and intrinsic factors was investigated. Results were compared with mosquito vector and human malaria data acquired over 4.5 years (June 1999 - January 2004) in Kong Mong Tha, a remote village in Kanchanaburi Province, western Thailand. The simulation method is useful for testing transmission hypotheses, estimating the efficacy of

insecticide applications, assessing the impacts of nonimmune immigrants, and predicting the effects of socioeconomic, environmental and climatic changes.
Author
Remote Sensing; Larvae; Habitats; Public Health; Infectious Diseases; Epidemiology

20080041511 Wisconsin Univ., Madison, WI, USA
Maintenance of Ecosystem Nitrogen Limitation by Ephemeral Forest Disturbance: An Assessment using MODIS, Hyperion, and Landsat ETM+
McNeil, Brenden E.; deBeurs, Kirsten M.; Eshleman, Keith N.; Foster, Jane R.; Townsend, Philip A.; Geophysical Research Letters; October 13, 2007; ISSN 0094-8276; Volume 34; 5 pp.; In English; Original contains black and white illustrations
Contract(s)/Grant(s): NNX07AG51G; NNG04GL87G; NNX086AD45G; 05-CS-11231300-063; Copyright; Avail.: Other Sources
ONLINE: http://dx.doi.org/10.1029/2007GL031387

Ephemeral disturbances, such as non-lethal insect defoliations and crown damage from meteorological events, can significantly affect the delivery of ecosystem services by helping maintain nitrogen (N) limitation in temperate forest ecosystems. However, the impacts of these disturbances are difficult to observe across the broad-scales at which they affect ecosystem function. Using remotely sensed measures and field data, we find support for the hypothesis that ephemeral disturbances help maintain landscape-wide ecosystem N limitation. Specifically, a phenology-based defoliation index derived from daily MODIS satellite imagery predicts three ecosystem responses from oak-dominated forested watersheds: elevated stream water N export (R(exp 2) = 0.48), decreased foliar N (R(exp 2) = 0.69, assessed with Hyperion imagery), and reduced vegetation growth vigor (R(exp 2) = 0.49, assessed with Landsat ETM+ imagery). The results indicate that ephemeral disturbances and other forest stressors may sustain N limitation by reducing the ability of trees to compete for--and retain--soil available N.
Author
Forests; Defoliation; Environment Effects; Ecosystems; Soils; Nitrogen; Environmental Monitoring; Remote Sensing; Thematic Mapping

20080041512 Wisconsin Univ., Madison, WI, USA
Estimating the Effect of Gypsy Moth Defloiation Using MODIS
deBeurs, K. M.; Townsend, P. A.; Remote Sensing of Environment; October 2008; Volume 112, Issue 10, pp. 3983-3990; In English; Original contains black and white illustrations
Contract(s)/Grant(s): NNG04GL87G; 05-CS-11231300-063; Copyright; Avail.: Other Sources
ONLINE: http://dx.doi.org/10.1016/j.rse.2008.07.008

The area of North American forests affected by gypsy moth defoliation continues to expand despite efforts to slow the spread. With the increased area of infestation, ecological, environmental and economic concerns about gypsy moth disturbance remain significant, necessitating coordinated, repeatable and comprehensive monitoring of the areas affected. In this study, our primary objective was to estimate the magnitude of defoliation using Moderate Resolution Imaging Spectroradiometer (MODIS) imagery for a gypsy moth outbreak that occurred in the US central Appalachian Mountains in 2000 and 2001. We focused on determining the appropriate spectral MODIS indices and temporal compositing method to best monitor the effects of gypsy moth defoliation. We tested MODIS-based Normalized Difference Vegetation Index (NDVI), Enhanced Vegetation Index (EVI), Normalized Difference Water Index (NDWI), and two versions of the Normalized Difference Infrared index (NDIIb6 and NDIIb7, using the channels centered on 1640 nm and 2130 nm respectively) for their capacity to map defoliation as estimated by ground observations. In addition, we evaluated three temporal resolutions: daily, 8-day and 16-day data. We validated the results through quantitative comparison to Landsat based defoliation estimates and traditional sketch maps. Our MODIS based defoliation estimates based on NDIIb6 and NDIIb7 closely matched Landsat defoliation estimates derived from field data as well as sketch maps. We conclude that daily MODIS data can be used with confidence to monitor insect defoliation on an annual time scale, at least for larger patches (greater than 0.63 km2). Eight-day and 16-day MODIS composites may be of lesser use due to the ephemeral character of disturbance by the gypsy moth.
Author
Moths; Forests; Defoliation; Environment Effects; Environmental Monitoring; MODIS (Radiometry)

20080041513 Maryland Univ., Frostburg, MD, USA

Validation of a Remote Sensing Based Index of Forest Disturbance Using Streamwater Nitrogen Data

Eshleman, Keith N.; McNeil, Brenden E.; Townsend, Philip A.; [2008]; 9 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): NNG04GL87G; Copyright; Avail.: Other Sources

ONLINE: http://dx.doi.org/10.1016/j.ecolind.2008.07.005

Vegetation disturbances are known to alter the functioning of forested ecosystems by contributing to export ('leakage') of dissolved nitrogen (N), typically nitrate-N, from watersheds that can contribute to acidification of acid-sensitive streams, leaching of base cations, and eutrophication of downstream receiving waters. Yet, at a landscape scale, direct evaluation of how disturbance is linked to spatial variability in N leakage is complicated by the fact that disturbances operate at different spatial scales, over different timescales, and at different intensities. In this paper we explore whether data from synoptic streamwater surveys conducted in an Appalachian oak-dominated forested river basin in western MD (USA) can be used to test and validate a scalable, synthetic, and integrative forest disturbance index (FDI) derived from Landsat imagery. In particular, we found support for the hypothesis that the interannual variation in spring baseflow total dissolved nitrogen (TDN) and nitrate-N concentrations measured at 35 randomly selected stream stations varied as a linear function of the change in FDI computed for the corresponding set of subwatersheds. Our results demonstrate that the combined effects of forest disturbances can be detected using synoptic water quality data. It appears that careful timing of the synoptic baseflow sampling under comparable phenological and hydrometeorological conditions increased our ability to identify a forest disturbance signal. Author

Forests; Ecosystems; Remote Sensing; Nitrogen; Annual Variations; Water Quality; Environmental Monitoring

20080041555 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Eurasian Reindeer Pastoralism in a Changing Climate: Indigenous Knowledge and NASA Remote Sensing

Maynard, N. G.; Burgess, P.; Oskal, P.; Turi, A.; Mathiesen, J. M.; Gaup, I. G. E.; Yurchak, B.; Etylin, V.; Gebelein, J.; [2008]; 27 pp.; In English; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

It is intended that Reindeer Mapper/EALAT will be able to provide reindeer herders with an efficient tool for managing the real-time movements and migrations of their herds through enabling improved efficiency in linking different members of the herder settlements or communities and providing real-time local, satellite or other data (e.g., ice melt in lakes and rivers, weather events), thus enabling real time adjustments to herd movements to avoid problems such as changing weather/climate conditions, freeze-thaw 'lock-out' problems, or take advantage of availability of better pasturelands along migration routes. The system is being designed to incorporate local data to allow users to bring their own data into the system for analysis in addition to the data provided by the system itself. With the local information of the population, up to date environmental data and habitat characteristics, the system could generate maps depicting important features of interest for reindeer managers. One of the products derived from the planned Reindeer Mapper system will be a web-based graphic display that allows analysts to quickly pinpoint areas of interest such as those with large concentrations of reindeer and provide surrounding environmental information. The system could be automatically updated with near-real-time information such as hourly precipitation and snowfall rate and accumulation, daily surface and air temperatures, and vegetation cover conditions. The system could bring attention to the proximity of human and animal populations as part of the need for control response. A local GIS will bring these many layers together with several supporting models, showing only a straightforward graphic of the real-time situation in the field. Because the system proposed will be operating in the Internet environment, it should be virtually accessible from any network computers and wireless remote access from the field. The International Center for Reindeer Husbandry in Kautokeino, Norway, is providing regional and international coordination of and access to data sets and expertise, and will act as overall clearinghouse for EALAT information. Author

Communication Networks; Coordination; Habitats; Real Time Operation; Systems Analysis; Remote Sensing; Animals; Migration

20080041608 RAND Corp., Santa Monica, CA USA

Mexico's Petroleum and U.S. Policy: Implications for the 1980s

Ronfeldt, David; Nehring, Richard; Gandara, Arturo; Jun 1980; 119 pp.; In English

Contract(s)/Grant(s): DE-AC01-79-PE70078

Report No.(s): AD-A483742; R-2510-DOE; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483742

This report explores the implications of major Mexican petroleum reserves for U.S. policy in the 1980s. Mexico's

petroleum development has prompted intense interest and evident confusion in U.S. public policy discussions. The present project was undertaken to do the following: (1) clarify key factors that will influence Mexico's future petroleum policies, (2) project expected policy outcomes, and (3) analyze the implications of these policies for U.S. interests and objectives. The project began at a time when bilateral gas export negotiations were arousing public controversy, which sometimes complicated the field research efforts. Although this report considers aspects of those negotiations, the major research objective was directed beyond the immediate political issues to analyze the factors, trends, and opportunities that will emerge in the coming decade. The authors' work in this area is motivated partly by their belief that U.S.-Mexican relations have entered a new era of increasing importance, complexity, and uncertainty, which may have profound consequences for a range of U.S. domestic and foreign policies. To manage the challenges of this new era in U.S.-Mexican relations, it will be necessary for both nations and their governments to raise their level of mutual understanding, insofar as better understanding will serve to improve the prospects for better cooperation. After a brief introduction, the report is divided into three sections. The first section offers a detailed analysis of Mexico's petroleum resources and production possibilities. The second section considers petroleum as a symbolic issue of profound significance for Mexican nationalism. The final section provides an assessment of these and other factors for U.S. interests, objectives, and policy options during the 1980s.
DTIC
Crude Oil; Foreign Policy; Industries; International Relations; International Trade; Mexico; United States

20080041610 RAND Corp., Santa Monica, CA USA
The Demand for Oil and Energy in Developing Countries
Wolf, Jr , Charles; Relles, Daniel A; Navarro, Jaime; May 1980; 64 pp.; In English
Report No.(s): AD-A483747; R-2488-DOE; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483747

How much of the world's oil and energy supply will the non-OPEC less-developed countries (NOLDCs) demand in the next decade? Will their requirements be small and thus fairly insignificant compared with world demand, or large and relatively important? How will world demand be affected by the economic growth of the NOLDCs? In this report, the authors try to develop some reasonable forecasts of the range of NOLDC energy demands in the next 10 years. They have tried to be explicit about the uncertainties associated with these forecasts, and with the income and price elasticities on which they are based. Finally, they consider the forecasts in terms of their implications for U.S. policies concerning NOLDCs, and suggest areas of future research on NOLDC energy issues. Although some results will be reported for total commercial demand for energy, and its associated income and price elasticities, their main emphasis is on NOLDC demand for oil. While they do not attempt to estimate cross elasticities of demand between oil and other fuels, the range of uncertainty in their reported estimates for oil demand is probably sufficient to cover a reasonable allowance for cross elasticities. Chapter 2 provides a brief background, summarizing previous estimates (or assumptions) about price and income elasticities of demand, previous demand forecasts, and the methods used in making them. Chapter 3 summarizes the models and data the authors have used, and their principal results: price and income elasticities for the NOLDCs as a group, and for several subgroups; forecasts of NOLDC oil and energy demand in 1985 and 1990; and the scaling of these forecasts relative to world demand for both energy and oil. Finally, Chapter 4 suggests implications for U.S. policy and for further research.
DTIC
Crude Oil; Developing Nations; Economic Development; Energy Consumption; Forecasting; Oils

20080041805 Army Cold Regions Research and Engineering Lab., Hanover, NH USA
FASST Soil Moisture, Soil Temperature: Original Versus New
Frankenstein, Susan; Apr 2008; 36 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484145; ERDC/CRREL-TR-08-7; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This paper discusses only the differences between the original version of FASST (Frankenstein and Koenig 2004a, 2004b) and the new version. This report is intended as a supplement to the original model documentation. In its original incarnation, energy and mass transport associated with water vapor in the soil matrix were ignored. The author added these so that model usage could be expanded to include biological investigations yet still retain its initial focus of soil strength, and sensor performance inputs. Also ignored in the original version was water transport due to soil temperature gradients. In determining the new soil temperatures and moistures, the original model first achieved convergence in the temperature profile followed by

the moisture profile at a given time step. The new version of FASST solves both of these sets of equations simultaneously. No changes have been made to the equations describing the canopy physical state except to allow for mixed precipitation.
DTIC
Equations; Moisture Content; Soil Mechanics; Soil Moisture; Soils; Temperature Gradients; Turbulent Flow

20080042187 RAND Corp., Santa Monica, CA USA
The Discovery of Significant Oil and Gas Fields in the USA
Nehring, Richard; Van Driest, II, E R; Jan 1981; 263 pp.; In English
Contract(s)/Grant(s): 14-08-0001-16593; DE-AC01-79-PE70078
Report No.(s): AD-A483831; RAND-R-2654/1-USGS/DOE; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483831

The purpose of this report is to provide a quantitative assessment of the ultimate conventional petroleum resources of the USA. The authors' primary innovations, as compared with earlier national petroleum resource assessments, were to create a consistently constructed and systematically organized data base listing all of the significant oil and gas fields in the USA outside of the Appalachian region and to use this data base to describe what has already been discovered and when these discoveries occurred. From these descriptions, they interpret why these discoveries happened when they did and evaluate the remaining geologic prospects to assess future possibilities. They also present extensive supporting data in the six appendixes forming the supplementary volume to this report. Their principal research task was to construct a data base of all the significant oil and gas fields in the USA that was organized to facilitate resource assessment. Section II describes this data base (provided in its entirety in Appendix A), the procedures that they followed in developing it, and its potential limitations. The data are organized into 12 geographic regions: (1) Alaska, (2) California (Pacific Coast), (3) Rocky Mountain, (4) Permian Basin, (5) North Central Texas, (6) Mid-Continent, (7) Western Gulf, (8) Central Gulf, (9) Northern Gulf, (10) Eastern Gulf, (11) Illinois-Michigan basins, and (12) Appalachian. Because of a lack of systematic field data for the Appalachian region, the data base does not include fields from that region. Section III discusses the distribution of U.S. petroleum resources by region and field size. Section IV focuses on the distribution of significant oil and gas discoveries in the USA by size over time. Section V examines discovery patterns and resource assessment.
DTIC
Crude Oil; Data Bases; Geographic Distribution; Natural Gas; Oil Fields; United States

20080042190 RAND Corp., Santa Monica, CA USA
The Discovery of Significant Oil and Gas Fields in the USA: Appendixes
Nehring, Richard; Van Driest, II, E R; Jan 1981; 500 pp.; In English
Contract(s)/Grant(s): 14-08-0001-16593; DE-AC01-79-PE70078
Report No.(s): AD-A483832; RAND-R-2654/2-USGS/DOE; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483832

The data appendixes included in this volume provide basic background for and supplement the descriptions and analyses presented in 'The Discovery of Significant Oil and Gas Fields in the USA,' R-2654/1-USGS/DOE, and should be used in conjunction with that volume. Appendix A consists of the significant oil and gas fields data base, the primary source of data for the descriptive analysis of Sections III and IV of the main report. Appendix B provides cumulative and current (1975) production data for crude oil and natural gas by field size class for each state or statistical area and region, supplementing the descriptive analyses of Section III. Appendix C lists the number of significant oil field discoveries in the USA by field size class over 5-year periods by region and type of field, supplementing the figures of Section IV. Appendix D gives data on the amounts of crude oil and natural gas discovered in the USA by 5-year periods up to and including 1975, also supplementing the figures of Section IV. Appendix E presents data on exploratory drilling by region in the USA from 1936 to 1975. Appendix F provides estimates of future significant discoveries in the lower 48 states by field size and region, supplementing the undiscovered resource estimates of Section V. Each appendix is preceded by a brief introduction that describes the tables in that appendix, the procedures used to prepare them, and their sources of data.
DTIC
Crude Oil; Data Bases; Geographic Distribution; Natural Gas; Oil Fields; United States

20080042306 NASA Dryden Flight Research Center, Edwards, CA, USA
Large UAS Operations in the NAS - The NASA 2007 Western States Fire Missions (WSFM)
Buoni, Gregory P.; Howell, Kathleen M.; September 14, 2008; 33 pp.; In English; 8th AIAA Aviation Technology, Integrated, and Operations Conference (ATIO), 14-19 Sep. 2008, Anchorage, AK, USA; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080042306

Objectives: Demonstrate capabilities of UAS to overfly and collect sensor data on wildfires throughout Western US. Demonstrate long-endurance mission capabilities (20+ hours). Image multiple fires (greater than 4 fires per mission), to showcase extendable mission configuration and ability to either linger over key fires or station over disparate regional fires. Deliver real-time imagery to (within 10-minutes of acquisition).
Derived from text
Fires; Forests; Pilotless Aircraft; Autonomous Navigation; Real Time Operation; Imagery

44
ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells; and solar, geothermal, windpower, and waterwave conversion systems; energy storage; and traditional power generators. For technologies related to nuclear energy production see *73 Nuclear Physics*. For related information see also *07 Aircraft Propulsion and Power; 20 Spacecraft Propulsion and Power*; and *28 Propellants and Fuels*.

20080040848 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Multiband Semiconductor Compositions for Photovoltaic Devices
Walukiewcz, W., Inventor; Yu, K. M., Inventor; Wu, J., Inventor; 29 Nov 04; 14 pp.; In English
Contract(s)/Grant(s): DE-AC03-76SF000-98
Patent Info.: Filed Filed 29 Nov 04; US-Patent-Appl-SN-10-999 456
Report No.(s): PB2008-104359; No Copyright; Avail.: CASI: A03, Hardcopy

The highly mismatched alloy Zn(sub 1)-yMn(sub y)O(sub x)Te(sub 1-x), 0 < or = y < 1 and 0 < x < 1 and other Group II-IV-Oxygen implanted alloys have been synthesized using the combination of oxygen ion implantation and pulsed laser melting. Incorporation of small quantities of isovalent oxygen leads to the formation of a narrow, oxygen-derived band of extended states located within the band gap of the Zn(sub 1-y)Mn(sub y)TE host. With multiple band gaps that fall within the solar energy spectrum, Zn(sub 1-y)Mn(sub y)O(sub x)Te(sub 1-x) is a material perfectly satisfying the conditions for single-junction photovoltaics with the potential for power conversion efficiencies surpassing 50%.
NTIS
Patent Applications; Semiconductor Devices; Semiconductors (Materials); Solar Energy

20080040853 Army Construction Engineering Research Lab., Champaign, IL USA
Electrical Assessment, Capacity, and Demand Study for Fort Wainwright, Alaska
Vavrin, John L; Brown, III, William T; Kemme, Michael R; Allen, Marcus A; Percle, Wayne J; Loran, Robert T; Stauffer, David B; Hudson, Kenneth; Sep 2007; 136 pp.; In English; Original contains color illustrations
Report No.(s): AD-A482419; ERDC/CERL-TR-07-35; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA482419

Headquarters, Installation Management Command (HQ IMCOM) commissioned a study team under the leadership of the Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL), to determine the electric power requirements of Fort Wainwright, Alaska (FWA) through the year 2020, and energy supply alternatives to meet these requirements. Of particular importance was that FWA management projected that the installation might experience electrical power shortages during the impending winter of 2006/2007 due to increases in energy demand resulting from troop deployments, new construction at the installation, reduction in the number of facilities scheduled for demolition, and the temporary loss of some Central Heating and Power Plant (CHPP) generating capacity. The study team was dispatched to FWA in May 2006 to: (1) determine if there was an imminent problem, (2) identify the most promising courses of action, and (3) identify options and estimate costs to meet the installation's power requirements through the year 2020.
DTIC
Energy Consumption; Electric Power

20080040854 Army Construction Engineering Research Lab., Champaign, IL USA

Preventive Maintenance and Reliability Study for the Central Heating and Power Plant at Fort Wainwright, Alaska

Vavrin, John L; Brown, III, William T; Kemme, Michael R; Westerman, John; Lorand, Robert; Walden, Charles; Swinehart, Curtis; Sep 2007; 126 pp.; In English; Original contains color illustrations

Report No.(s): AD-A482417; ERDC/CERL-TR-07-35; No Copyright; Avail.: Defense Technical Information Center (DTIC) ONLINE: http://hdl.handle.net/100.2/ADA482417

The Technology Requirements Study for a new Central Heating and Power Plant (CHPP) at Fort Wainwright, Alaska (FWA) (Vavrin et al. 2006) recommended that if the option for a new CHPP were to be pursued, among the tasks suggested for further analysis was to determine predictive maintenance requirements and new technologies for the existing plant. This study was undertaken to develop a Preventative Maintenance (PM) assessment that includes a maintenance program overview for the major systems in the existing CHPP. The assessment entailed: (1) an identification of shortcomings and deficiencies of existing procedures and processes, (2) recommendations to overcome shortcomings and deficiencies, (3) development of a maintenance schedule, (4) development of an estimate of staffing requirements, and (5) development of a budget estimate for execution of the recommended PM program with breakout for costs, detailed annually for a period of 25 years. This study also identified, prioritized, and separately broke out new technologies and associated costs that would significantly improve the reliability of the existing CHPP.

DTIC

Electric Power Plants; Energy Conservation; Preventive Maintenance; Reliability

20080041246 Naval Postgraduate School, Monterey, CA USA

In-Situ Optical Imaging of Carrier Transport in Multilayer Solar Cells

Rauscher, Brian C; Jun 2008; 59 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483453; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The goal of this thesis is to explore the utility of in-situ optical imaging of charge transport imaging in multi junction solar cells. An in-situ measurement of a manufactured solar cell's key material parameters is difficult. Many sophisticated models may be used to predict performance of new cell arrangements and suggest next generation improvements. In parallel an experimental view into a complex multi layered alloyed semiconductor device can provide important feedback for material growth and device fabrication. This body of work builds on the previous work of extracting estimated minority carrier diffusion lengths from multi junction solar cell materials. Indium Gallium Phosphide double heterostructures have been investigated previously with effective results. A technique to estimate electron diffusion length from a luminescent sample intensity distribution has been developed. This thesis investigates imaging transport and applying the diffusion length estimation directly in the triple junction device. Luminescence from individual layers was isolated using optical filters. The effect of varying temperature and applying bias during the imaging technique is investigated as well. A strong dependence of effective diffusion length on environmental temperature was measured. In addition a weak dependence of effective diffusion length on bias was measured with the effect slightly greater in the top as compared to the central cell.

DTIC

Images; Imaging Techniques; Solar Cells

20080041270 Naval Postgraduate School, Monterey, CA USA

The Role of the Department of Defense (DoD) in Solar Energy Research, Development and Diffusion

Benham, Jr , William T; Cabral, III, Noel J; Jun 2008; 117 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483508; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The DoD uses approximately 1.8 percent of the oil consumed each day in the U.S. and is the largest single institutional energy customer in the USA. Additionally, the U.S. has the highest per capita oil consumption rate in the world. Mindful of America's growing dependence on foreign oil and the geopolitical forces that threaten world supplies and national security, DoD has vowed to convert to 25 percent renewable energy use by 2025. Through strategic partnerships with NGOs, commercial industry, and academia, DoD's unique organizational capacity makes it suited to not only reach this goal, but to serve as an example for a national transformation toward a new energy future. This report examines the feasibility of niche solar energy applications and the methods that DoD might positively impact solar energy research, development and technology diffusion.

DTIC

Defense Program; Diffusion; Energy Technology; Renewable Energy; Solar Energy

20080041352 Naval Postgraduate School, Monterey, CA USA
Russia's Energy Policies and Ukraine's NATO Candidacy
Imblum, Mark A; Jun 2008; 87 pp.; In English
Report No.(s): AD-A483735; No Copyright; Avail.: Defense Technical Information Center (DTIC)

NATO enlargement and the European Union's growing dependence on external energy supplies controlled by Russia have simultaneously developed into crucial security issues in Europe. The emerging interaction between Alliance enlargement and energy policies may yet affect Ukraine's future relationship with NATO as well as Russia and even determine which direction NATO takes regarding Ukraine's candidacy for membership. As the leading natural gas exporter with the largest proven gas reserves in the world, Russia provides more natural gas to the European Union than any other supplier. Eighty percent of Russian-controlled gas (from Central Asian countries as well as Russia) transits Ukraine for Europe, amplifying Ukraine's geostrategic significance. Russia and several West European members of NATO continue to augment their economic interdependence through strategic and lucrative natural gas agreements. The amalgamation of key NATO European states' strong dependency on Russian natural gas and Ukraine's potential NATO membership makes Kyiv's political and strategic orientation a relevant and contemporary question for the USA and its NATO Allies. Russian-European energy interdependence could lead to a rift within the Alliance regarding Ukraine's candidacy for NATO membership, but cooperative solutions may yet be achieved.
DTIC
Energy Policy; North Atlantic Treaty Organization (NATO); Russian Federation; Ukraine

20080041454 Mahamedi (Shemwell), LLP, San Jose, CA, USA
Rack Assembly for Mounting Solar Modules
Plaisted, J. R., Inventor; West, B., Inventor; 13 Jan 06; 36 pp.; In English
Contract(s)/Grant(s): DE-NDC-5-55022-01; DE-NDO-3-33457-02
Patent Info.: Filed Filed 13 Jan 06; US-Patent-Appl-SN-11-332 000
Report No.(s): PB2008-103574; No Copyright; Avail.: CASI: A03, Hardcopy

A rack assembly is provided for mounting solar modules over an underlying body. The rack assembly may include a plurality of rail structures that are arrangeable over the underlying body to form an overall perimeter for the rack assembly. One or more retention structures may be provided with the plurality of rail structures, where each retention structure is configured to support one or more solar modules at a given height above the underlying body. At least some of the plurality of rail structures are adapted to enable individual rail structures o be sealed over the underlying body so as to constrain air flow underneath the solar modules. Additionally, at least one of (1) one or more of the rail structures, or (2) the one or more retention structures are adjustable so as to adapt the rack assembly to accommodate solar modules of varying forms or dimensions.
NTIS
Modules; Mounting; Patent Applications; Solar Cells

20080041628 Celltech Power, LLC, Westborough, MA USA
Direct Logistic Fuel JP-8 Conversion in a Liquid Tin Anode Solid Oxide Fuel Cell (LTA-SOFC)
Tao, Thomas; Bentley, Jeff; Koslowske, Mark; Bateman, Linda; McPhee, Bill; Apr 9, 2008; 25 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-07-C-0032
Report No.(s): AD-A483812; CTP-700-ARO-DARPA-F; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483812

This program was proposed as an extension of the DARPA/MISER program that was concluded in the first half of 2006. The DARPA/MISER program objective was the development of a technology for direct conversion of field packaging waste into energy. Under the DARPA/MISER program CellTech Power also demonstrated the ability of the Liquid Tin Anode Solid Oxide Fuel Cell (LTA SOFC) to direct convert logistic fuel, JP-8. The demonstration of direct JP-8 conversion without fuel processing or reforming was unprecedented in fuel cell technology. The DOD has a broad interest in power generation using logistic fuel only. The aim of this program was to advance LTA-SOFC technology with respect to direct conversion of JP-8.
DTIC
Anodes; Cell Anodes; Electric Generators; Electric Power Plants; Energy Conversion; JP-8 Jet Fuel; Liquid Fuels; Solid Oxide Fuel Cells; Tin; Tin Oxides

20080041680 Rochester Inst. of Tech., NY USA

Understanding/Modelling of Thermal and Radiation Benefits of Quantum Dot Solar Cells

Raffaelle, Ryne P; Jul 11, 2008; 21 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-06-1-0319

Report No.(s): AD-A483934; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483934

The radiation and thermal dependence of strain compensated InAs QD/ GaAs solar cells have been investigated. Strain compensation is a key step in realizing high efficiency quantum dots solar cells (QDSC). InAs quantum dots (QDs) are grown using the Stranski-Krastenov growth mode which relies on strain, resulting from the mismatch between the InAs and the GaAs lattice parameters, to initiate three-dimensional growth. The generation of QDs does reduce the local strain but it is not completed alleviated. Therefore, as additional layers of InAs QDs are grown a significant tensile strain is builtup. During solar cell growth, this strain is naturally relieved by forming misfit boundaries and threading dislocations, which can damage the depletion region of the device. Strain relief is accomplished by growing the proper thickness of a compressively strained GaP, between each successive QD array.

DTIC

Quantum Dots; Solar Cells; Thermal Radiation

20080041683 Library of Congress, Washington, DC USA

Rising Energy Competition and Energy Security in Northeast Asia: Issues for U.S. Policy

Chanlett-Avery, Emma; May 13, 2008; 28 pp.; In English

Report No.(s): AD-A483943; CRS-RL32466; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483943

Asia has become a principal driver in world energy markets, largely due to China's remarkable growth in demand. As the gap between consumption and production levels in Asia expands, the region's economic powers appear to be increasingly anxious about their energy security, concerned that tight supplies and consequent high prices may constrain economic growth. Rising energy competition in East Asia promises to affect U.S. policy in many ways, from contributing to price spikes because of China's rapidly increasing demand to altering the geostrategic landscape in the years to come as regional powers struggle to secure access to energy supplies. This report analyzes how China, Japan, and South Korea's pursuits to bolster their energy security impacts U.S. interests. It also examines decisions being made by Asian states now that will significantly shape global affairs in the future, how these decisions might play out, and how Congress and the executive branch might play a role in those decisions. China, Japan, and South Korea have been moving aggressively to shore up partnerships with existing suppliers and pursue new energy investments overseas, often downplaying doubts about the technical feasibility and economic profitability of new development. Their outreach to suppliers includes the development of close ties with Iran, a key concern to U.S. policymakers given skepticism about Tehran's nuclear program. This report outlines the energy portfolios and strategies of the three countries, including their pursuit of alternatives to petroleum.

DTIC

Asia; Competition; Energy Consumption; Policies; Security

20080041843 Illinois Univ. at Urbana-Champaign, Urbana, IL USA

Optimized Power Generation and Distribution Unit for Mobile Applications

Alleyne, Andrew; Sep 2006; 136 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-04-1-0067

Report No.(s): AD-A484230; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This research project focused on determining optimal power generation and distribution within a mobile human-scale power system. The intended application was for a human scale exoskeleton, in particular underwater applications. However, the tools and techniques are applicable for a broad range of mobile systems that carry a finite energy supply and need to optimize both the system performance and system efficiency. A wide survey of appropriate energy storage and power generation technologies was performed. Subsequently, a decision making algorithm was developed that specifically determined the best way to convert stored energy to available power coupled with the best way to distribute this power to multiple needs within the system. A dual stage decision making strategy was adopted whereby fast inner stage would determine both the needed power and the optimal control of the particular power application within the system. A slower second stage would accept the power demands from the first stage and then determine the optimal way generate that power from the stored energy source. The strategy was tested in simulation and experimentally. It was determined that a significant

energy savings can be accomplished over conventional power management schemes while still achieving a particular mission's performance requirements.
DTIC
Electric Generators; Electric Power Plants; Exoskeletons

20080042143 Fischer (Epping Hermann), Munich, Germany
OLEDS with Phosphors (PAT-APPL-11-028 881)
Stegamat, R., Inventor; Antoniadis, H., Inventor; 4 Jan 05; 8 pp.; In English
Contract(s)/Grant(s): DE-FC26-04NT41947
Patent Info.: Filed Filed 4 Jan 05; US-Patent-Appl-SN-11-028 881
Report No.(s): PB2008-104533; No Copyright; Avail.: CASI: A02, Hardcopy

An OLED application such as a light source is disclosed which has OLED elements utilizing an active EL (electro-luminescent) layer comprised of two elements, a host element emitting in a first spectrum and a dopant element emitting in a second spectrum different from the first. The OLED device also has a luminescent material disposed on the substrate or transparent electrode which converts the emission spectrum of light from the active EL layer.
NTIS
Light Sources; Patent Applications; Phosphors

20080042151 McCarter and English, LLP, Newark, NJ, USA
Method of Junction Formation for CIGS Photovoltaic Devices
Delahoy, A. E., Inventor; 24 Feb 06; 9 pp.; In English
Contract(s)/Grant(s): ZAK-17619-21; DE-AC36-99GO10337
Patent Info.: Filed Filed 24 Feb 06; US-Patent-Appl-SN-11-361 776
Report No.(s): PB2008-104517; No Copyright; Avail.: CASI: A02, Hardcopy

Sulfur is used to improve the performance of CIGS devices prepared by the evaporation of a single source ZIS type compound to form a buffer layer on the CIGS. The sulfur may be evaporated, or contained in the ZIS type material, or both. Vacuum evaporation apparatus of many types useful in the practice of the invention are known in the art. Other methods of delivery, such as sputtering, or application of a thiourea solution, may be substituted for evaporation.
NTIS
Patent Applications; Semiconductors (Materials); Solar Cells

20080042152 National Renewable Energy Lab., Golden, CO USA
High-Efficiency, Monolithic, Multi-Bandgap, Tandem Photovoltaic Energy Converters
Wanlass, M. W., Inventor; 30 Dec 04; 19 pp.; In English
Contract(s)/Grant(s): DE-AC36-99GO10337
Patent Info.: Filed Filed 30 Dec 04; US-Patent-Appl-SN-11-027 156
Report No.(s): PB2008-104516; No Copyright; Avail.: CASI: A03, Hardcopy

A monolithic, multi-bandgap, tandem solar photovoltaic converter has at least one, and preferably at least two, subcells grown lattice-matched on a substrate with a bandgap in medium to high energy portions of the solar spectrum and at least one subcell grown lattice-mismatched to the substrate with a bandgap in the low energy portion of the solar spectrum, for example, about 1 eV.
NTIS
Direct Power Generators; Energy Gaps (Solid State); Patent Applications

20080042265 Greenlee Winner and Sullivan, PC, Boulder, CO, USA
Solar-Thermal Fluid-Wall Reaction Processing
Weimer, A. W., Inventor; Dahl, J. K., Inventor; Lewandowski, A. A., Inventor; Bingham, C., Inventor; Buechler, K. J. R., Inventor; 14 Feb 06; 15 pp.; In English
Contract(s)/Grant(s): DE-FC36-99G010454; DE-FC36-99G010337
Patent Info.: Filed Filed 14 Feb 06; US-Patent-Appl-SN-11-354 544
Report No.(s): PB2008-103935; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention provides a method for carrying out high temperature thermal dissociation reactions requiring rapid-heating and short residence times using solar energy. In particular, the present invention provides a method for carrying

out high temperature thermal reactions such as dissociation of hydrocarbon containing gases and hydrogen sulfide to produce hydrogen and dry reforming of hydrocarbon containing gases with carbon dioxide. In the methods of the invention where hydrocarbon containing gases are dissociated, fine carbon black particles are also produced. The present invention also provides solar-thermal reactors and solar-thermal reactor systems.
NTIS
Process Heat; Solar Generators; Walls; High Temperature; Solar Energy

20080042355 Intellectual Property/Technology Law, Research Triangle Park, NC, USA
Substrate-Supported Process for Manufacturing Microfibrous Fuel Cells
Eshraghi, R. R., Inventor; Ketterer, M. E., Inventor; Si, Y., Inventor; 13 Jan 06; 21 pp.; In English
Contract(s)/Grant(s): NIST-70NANB1H3039
Patent Info.: Filed Filed 13 Jan 06; US-Patent-Appl-SN-11-331 812
Report No.(s): PB2008-103984; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention relates to a substrate-supported process for continuous and automated manufacturing of microfibrous fuel cells and other electrochemical cells. Specifically, a removable substrate layer is formed around an inner current collector, followed by sequentially coating multiple structure layers, such as the inner catalyst layer, the membrane separator, and the outer catalyst layer, over such removable substrate layer, and subsequent removing such removable substrate layer, so as to form a lumen around the inner current collector, to allow passage of fluid therethrough. The removable substrate layer preferably comprises a water-soluble polymer, such as polyvinyl pyrrolidone (PVP), polyvinyl alcohol (PVA), or polyethylene glycol (PEG).
NTIS
Fuel Cells; Manufacturing; Microfibers; Patent Applications; Substrates

20080042388 NASA Glenn Research Center, Cleveland, OH, USA
Lunar RFC Reliability Testing for Assured Mission Success
Bents, David J.; [2008]; 8 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 038957.04.06.01
Report No.(s): Rept-2008-01-2901; Copyright; Avail.: Other Sources

NASA's Constellation program has selected the closed cycle hydrogen oxygen Polymer Electrolyte Membrane (PEM) regenerative Fuel Cell (RFC) as its baseline solar energy storage system for the lunar outpost and manned rover vehicles. Since the outpost and manned rovers are 'human-rated', these energy storage systems will have to be of proven reliability exceeding 99 percent over the length of the mission. Because of the low (TRL=5) development state of the closed cycle hydrogen oxygen PEM RFC at present, and because there is no equivalent technology base in the commercial sector from which to draw or infer reliability information from, NASA will have to spend significant resources developing this technology from TRL 5 to TRL 9, and will have to embark upon an ambitious reliability development program to make this technology ready for a manned mission. Because NASA would be the first user of this new technology, NASA will likely have to bear all the costs associated with its development. When well-known reliability estimation techniques are applied to the hydrogen oxygen RFC to determine the amount of testing that will be required to assure RFC unit reliability over life of the mission, the analysis indicates the reliability testing phase by itself will take at least 2 yr, and could take up to 6 yr depending on the number of QA units that are built and tested and the individual unit reliability that is desired. The cost and schedule impacts of reliability development need to be considered in NASA's Exploration Technology Development Program (ETDP) plans, since life cycle testing to build meaningful reliability data is the only way to assure 'return to the moon, this time to stay, then on to Mars' mission success.
Author
Constellation Program; Regenerative Fuel Cells; Lunar Bases; Closed Cycles; Energy Storage; Electrolytes; Membranes; Solar Energy; Roving Vehicles; Reliability Analysis

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ENVIRONMENT POLLUTION

Includes atmospheric, water, soil, noise, and thermal pollution.

20080040815 Fossil Consulting Services, Inc., Columbia, MD, USA
Maryland Industrial Boilers Emissions Report
Sherwell, J.; Drosjack, S.; Sheik, S.; Sep. 28, 2005; 80 pp.; In English
Report No.(s): PB2008-100790; No Copyright; Avail.: CASI: A05, Hardcopy

This report identifies industrial boilers and process heaters installed in Maryland with heat input capacities greater than 10 million Btu per hour, and estimates their nitrogen oxides (NO-x) and carbon dioxide (CO2) emissions. This report also describes potential control technologies or operating and maintenance techniques for reducing these emissions. The operational information relating to industrial boilers and process heaters in Maryland and data on their emissions were obtained from the publicly available Environmental Protection Agency (EPA) National Emissions Inventory (NEI) database or were calculated. The emissions reduction technologies and techniques presented in this report have been in use on similar equipment for many years and have demonstrated effectiveness in reducing emissions by significant amounts. The information presented in this report will prove useful to legislators, as well as owners and operators of industrial boilers and process heaters in identifying possible reductions in the emission of ozone forming NO-x and greenhouse gases from these Maryland sources, and potential controls for achieving those reductions.
NTIS
Air Pollution; Boilers; Pollution Control

20080040879 ARCADIS Geraghty and Miller, Inc., Research Triangle Park, NC USA
Measurement of Total Site Mercury Emissions from a Chlor-Alkali Plant Using Open-Path UV-DOAS
Jul. 2007; 146 pp.; In English
Report No.(s): PB2008-103892; No Copyright; Avail.: National Technical Information Service (NTIS)

In December 2003, the EPA promulgated the National Emission Standard for Hazardous Air Pollutants for mercury cell chlor-alkali plants. In February 2004, the Natural Resources Defense Council filed petitions on the final rule in U.S. district court citing, among other issues, the inability of mercury cell industries to fully account for mercury added to their processes to make up for losses via wastes, products and emissions. In April 2004, EPA agreed to reconsider aspects of the rule making which led to planning and execution of emission measurement projects designed to reduce uncertainty in fugitive emissions of Hg from mercury cell chlor-alkali plants. As an overall project goal, the research will use the total site mercury emission data presented in this report, in conjunction with cell room vent monitoring, stack emission and maintenance activity data to determine if the elemental mercury cell room fugitive emissions from the observed facilities are on the order of historical assumptions (1,300 g/day) or on the order of 2002 levels of unaccounted for mercury (approximately 10,000 g/day).
NTIS
Alkalies; Mercury (Metal); Emission

20080040892 Agency for Toxic Substances and Disease Registry, Atlanta, GA, USA
Health Consultation: Historical Outdoor Air Emissions in the Endicott Area, International Business Machines Corporation (IBM), Village of Endicott, Broome County, New York. EPA Facility ID: NYD002233039
Nov. 17, 2006; 87 pp.; In English
Report No.(s): PB2008-104059; No Copyright; Avail.: National Technical Information Service (NTIS)

In this health consultation, the Agency for Toxic Substances and Disease Registry (ATSDR) describes its evaluation of past environmental exposures to air pollution in and around Endicott Village, located in the Town of Union in Broome County, New York. Consistent with community concerns, the evaluation focuses on air quality impacts associated with emissions of volatile organic compounds (VOCs) from the former International Business Machines Corporation (IBM) facility located near the center of the village. The evaluation focuses on the time frame (i.e., years before 1994) when VOC emissions from industrial sources throughout the area were considerably higher than their current levels. Although this document focuses largely on IBM, ATSDR considered air quality impacts from other local industrial operations and emissions sources, to the extent appropriate.
NTIS
Air Pollution; Commerce; Health; Histories; New York; Volatile Organic Compounds

20080040930 California Univ., Davis, CA, USA
Source Apportionment of Fine and Ultrafine Particles in California
Kleeman, M. J.; January 2007; 268 pp.; In English
Contract(s)/Grant(s): CARB-01-306
Report No.(s): PB2008-102810; No Copyright; Avail.: CASI: A12, Hardcopy

Source profiles for particles smaller than 0.1 microgram in diameter (PM0.1) were measured from light-duty gasoline-powered vehicles, heavy-duty diesel vehicles, pine wood combustion, oak wood combustion, eucalyptus wood combustion, rice straw combustion, and meat cooking. The high-resolution size-resolved measurements revealed that tailpipe emissions of particles from gasoline- and diesel-powered vehicles contain separate contributions from lubricating oil and fuel that can be resolved using different tracer compounds. Measurements in a roadside environment demonstrated that the majority of the roadway PM0.1 mass was derived from gasoline fuel and diesel fuel with smaller contributions from lubricating oil. Measurements at Sacramento, Modesto, and Bakersfield during the California Regional Particulate Air Quality Study (CRPAQS) showed that the majority of the PM0.1 mass was composed of organic carbon with smaller amounts of elemental carbon. Wood combustion and meat cooking account for the majority of the PM0.1 organic carbon and therefore the majority of the PM0.1 mass. Gasoline fuel, diesel fuel, and lubricating oil accounted for the majority of the PM0.1 elemental carbon, which constitutes a smaller fraction of the PM0.1 mass but may be equally important for health effects.
NTIS
Air Pollution; Particulates; Pollution Monitoring

20080041028 Swedish Water and Air Pollution Research Lab., Stockholm, Sweden
Testing and Development of a New Precipitation Gauge for Chemical Analysis
Ferm, M.; Jun. 2007; 21 pp.; In English
Report No.(s): PB2008-103309; IVL-B-1755; No Copyright; Avail.: National Technical Information Service (NTIS)

Representative sampling of precipitation above ground is very difficult because the sampler itself affects the trajectory of the meteor. If chemical analysis of the precipitation is of interest, the sampling has to be made well above the ground. Samplers made of suitable material but not of optimal aerodynamical shape are traditionally used for collecting precipitation for chemical analysis by environmentalists worldwide. The obtained concentration is multiplied by the precipitation amount to obtain the wet deposition. Sometimes the precipitation amount from the same sampler that collects precipitation for chemical analysis is used and sometimes it is obtained from a standard gauge or from model calculations. Even if the material in the sampler is inert with respect to the ions analysed, the concentration can be wrong. If the sampling efficiency varies with time (due to changes in wind speed or droplet size), the precipitation weighted average concentration will not be correct. A sampler consisting of a snow sack in a wind protective tube has been modified in several steps to resemble a sampler used by meteorologist for measuring the precipitation amount on a daily basis. The two samplers measured similar precipitation amounts when a thinner rim was introduced on top of the tube containing the snow sack.
NTIS
Chemical Analysis; Errors; Measuring Instruments

20080041029 Environmental Protection Agency, Washington, DC, USA
Guidance for Biodiesel Producers and Biodiesel Blenders/Users
Nov. 2007; 8 pp.; In English
Report No.(s): PB2008-103291; EPA/420/B-07/019; No Copyright; Avail.: CASI: A02, Hardcopy

The purpose of this document is to explain and clarify EPAs regulatory requirements for biodiesel producers and biodiesel blenders/users. While the term biodiesel generally has a broad interpretation, as used in this guidance document, its meaning is directed specifically to biodiesel-ester.
NTIS
Mixers; Regulations

20080041031 Office of Air Quality Planning and Standards, Research Triangle Park, NC USA
Technical Guidance for the Development of Tribal Air Monitoring Programs
Aug. 2007; 177 pp.; In English
Report No.(s): PB2008-102575; EPA/456/B-07/002; No Copyright; Avail.: National Technical Information Service (NTIS)

The intent of this document is to help tribes gain a better understanding of the ambient air monitoring process and provide information on resources and tools that help to build and sustain an air quality monitoring program. This document includes

the following information to help tribes plan, implement and assess their air quality program activities: steps for identifying goals and objectives for conducting air monitoring; information for planning and selecting the appropriate type of monitoring network including discussions of staffing, network design, monitor selection, quality system development and training; costs for operating a monitoring network, funding sources and resources for writing a grant proposal and work plan; implementation of monitoring networks; data acquisition, management and reporting, and data analysis and interpretation including information on modeling techniques.
NTIS
Air Quality; Air Sampling; Ambience; Environmental Monitoring

20080041032 Office of Air Quality Planning and Standards, Research Triangle Park, NC USA
Lead: Human Exposure and Health Risk Assessments for Selected Case Studies. Volume 2: Appendices
Oct. 2007; 875 pp.; In English
Report No.(s): PB2008-102574; EPA/452/R-07/014B; No Copyright; Avail.: National Technical Information Service (NTIS)

Appendices for report titled: 'Lead: Human Exposure and Health Risk Assessments for Selected Case Studies. Volume 1: Human Exposure and Health Risk Assessments - Full-Scale.' Order number PB2008-102573.
NTIS
Air Quality; Ambience; Exposure; Health; Risk

20080041033 Office of Air Quality Planning and Standards, Research Triangle Park, NC USA
Lead: Human Exposure and Health Risk Assessments for Selected Case Studies. Volume 1: Human Exposure and Health Risk Assessments - Full-Scale
Oct. 2007; 172 pp.; In English
Report No.(s): PB2008-102573; EPA/452/R-07/014A; No Copyright; Avail.: National Technical Information Service (NTIS)

This document is the first volume of the report Lead: Human Exposure and Health Risk Assessments for Selected Areas. This volume describes the quantitative human exposure and health risk assessments conducted to inform the U.S. Environmental Protection Agencys (EPAs) current review of the National Ambient Air Quality Standards (NAAQS) for lead (Pb). As with the last review of the Pb NAAQS, the human exposure and health risk assessments (the risk assessment) for this review reflect multimedia exposure pathways, and their influence on blood Pb levels as an internal index of exposure or dose. The assessment for this review, as with that for the last review, utilizes a case study approach wherein a set of specific locations or case studies associated with policy-relevant Pb exposures are evaluated in detail. The case studies have been selected to provide a perspective on the nature and magnitude of air source Pb exposures and risk in the USA. There are two phases to the risk assessment for the current review: pilot and full-scale. The first phase (the pilot assessment) was presented in the first draft Staff Paper and accompanying technical report (USEPA, 2006a; ICF, 2006), and was the subject of a review by the Clean Air Scientific Advisory Committee (CASAC) on February 6 and 7, 2007 (Henderson, 2007a). The initial full-scale analyses were presented in the July 2007 draft report (USEPA, 2007b) and were the subject of a CASAC review at a public meeting on August 28 and 29, 2007. In response to CASAC recommendations (Henderson, 2007b), additional analyses, using a core modeling approach were conducted to complete the full-scale assessment. All analyses for the full-scale assessment are described in this document, with the initial analyses being the focus in Chapters 3 and 4 and the additional analyses in Chapter 5. Further, given the significant time constraints of this review, risk results are provided in this document without substantial interpretation. Rather, interpretative discussion of these results is provided in the Staff Paper.
NTIS
Air Quality; Ambience; Exposure; Health; Risk

20080041034 Office of Air Quality Planning and Standards, Research Triangle Park, NC USA
Review of the National Ambient Air Quality Standards for Lead: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper
Nov. 2007; 344 pp.; In English
Report No.(s): PB2008-102572; EPA/452/R-07/013; No Copyright; Avail.: National Technical Information Service (NTIS)

This OAQPS Staff Paper, prepared by staff in the U.S. Environmental Protection Agencys (EPA) Office of Air Quality Planning and Standards (OAQPS), presents factors relevant to EPAs current review of the primary (health-based) and secondary (welfare-based) lead (Pb) national ambient air quality standards (NAAQS) that were originally established in 1978.

In this document, OAQPS staff evaluates the policy implications of the key studies and scientific information contained in the final document, Air Quality Criteria for Lead (USEPA, 2006a; henceforth referred to as the CD), prepared by EPAs National Center for Environmental Assessment, and presents and interprets results from several quantitative analyses (e.g., human exposure analyses, human health risk assessments and environmental assessments) that we believe should also be considered in EPA's review of the Pb NAAQS. Further, this document presents OAQPS staff conclusions and recommendations on a range of policy options that we believe are appropriate for the Administrator to consider concerning whether, and if so how, to revise the primary and secondary Pb NAAQS. The policy assessment presented in this Staff Paper is intended to help bridge the gap between the scientific assessment contained in the CD and the judgments required of the EPA Administrator in determining whether it is appropriate to retain or revise the NAAQS for Pb. In evaluating the adequacy of the current standard and a range of policy alternatives, OAQPS staff has considered the available scientific evidence and quantitative risk-based analyses, together with related limitations and uncertainties, and has focused on the information that is most pertinent to evaluating the basic elements of air quality standards: indicator, averaging time, form, and level. These elements, which together serve to define each standard, must be considered collectively in evaluating the health and welfare protection afforded by the Pb standards. The information, conclusions, and staff recommendations presented in this Staff Paper have been informed by comments and advice received from an independent scientific review committee, the Clean Air Scientific Advisory Committee (CASAC), in their reviews of an earlier draft of this document and drafts of related technical support documents, as well as comments on these earlier draft documents submitted by public commenters.
NTIS
Air Quality; Ambience; Policies

20080041035 Office of Air Quality Planning and Standards, Research Triangle Park, NC USA
Ozone Population Exposure Analysis for Selected Urban Areas, July 2007
Jul. 2007; 333 pp.; In English
Report No.(s): PB2008-102571; EPA/452/R-07/010; No Copyright; Avail.: National Technical Information Service (NTIS)

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (NAAQS) for widespread pollutants from numerous and diverse sources considered harmful to public health and the environment. EPA has set NAAQS for the following pollutants, which are called criteria pollutants: ozone, particulate matter, carbon monoxide, sulfur dioxide, nitrogen oxides, and lead. The Clean Air Act requires periodic review of the science upon which the standards are based and the standards themselves to (1) ensure that they provide adequate health and environmental protection and (2) update those standards as necessary. This report documents the methodology and input data used in the inhalation exposure assessment for ozone conducted in support of the current review of the ozone NAAQS. Specifically, this report includes the following: Summary of the overall inhalation exposure assessment methodology; Description of the inhalation exposure model used in this assessment; Description of the input data used for the 12 selected urban areas; Assessment of the quality and limitations of the input data for supporting the goals of the ozone NAAQS exposure analysis; and Sensitivity analyses.
NTIS
Air Quality; Ambience; Cities; Ozone; Populations; Respiration

20080041036 Abt Associates, Inc., Bethesda, MD, USA
Ozone Health Risk Assessment for Selected Urban Areas, July 2007
Post, E.; Maier, A.; Mahoney, H.; Jul. 2007; 461 pp.; In English
Report No.(s): PB2008-102570; No Copyright; Avail.: National Technical Information Service (NTIS)

This July 2007 edition contains revised lung function risk estimates based on revised exposure estimates resulting from technical corrections to the exposure model made subsequent to the January 2007 editions of the Staff Paper and accompanying Technical Support Document (TSD). As noted in chapters 4 and 5 of the July 2007 edition of the Staff Paper, a small error was detected in the exposure model in January 2007 that resulted in small increases in the exposure estimates. This error has been corrected and the model runs have been redone, generally resulting in small increases in the exposure estimates. The revised lung function risk estimates, based on the corrected exposure estimates, are generally slightly higher than the original estimates presented in the January 2007 edition of the Staff Paper and accompanying TSD. The corrected lung function risk estimates for all children and for asthmatic children are presented in this edition of the TSD in Chapter 3 and associated appendices as well as in the July 2007 edition of the Staff Paper. Due to time constraints, however, the lung function risk estimates for active children, presented in Appendix C of the TSD, were not revised. Also due to time constraints, the date on the footer was not updated to July 2007. Sections 1, 2, and 4 of this edition of the TSD and the results in the Appendices

for health endpoints other than lung function remain unchanged with the exception of some minor corrections and updates to several references.
NTIS
Cities; Health; Ozone; Risk Assessment

20080041037 Agency for Toxic Substances and Disease Registry, Atlanta, GA USA
Public Health Assessment for Ambient Air Quality in Suncook Village, Merrimack County, New Hampshire, September 7, 2007. EPA Facility ID: NHD000791509
Sep. 07, 2007; 80 pp.; In English
Report No.(s): PB2008-102568; No Copyright; Avail.: National Technical Information Service (NTIS)

The overall conclusion of the current report is that ambient air in Suncook Village does not present a health hazard to the general population. During the two-year study period, the Suncook area was in compliance with all National Ambient Air Quality Standards, including those for the three criteria pollutants examined in this report: sulfur dioxide, ozone, and PM2.5. There are infrequent days (or hours) when air pollution levels in the Suncook area may result in adverse health effects among asthmatics during outdoor exertion. These air pollution events fall into two distinct categories based on the pollutants involved, the proximity of their source, and the meteorological conditions associated with them. Sulfur dioxide events in Suncook Village are associated with local emissions that are transported a short distance by strong northwest winds primarily in winter months. Ozone events originate from regional and distant sources and are transported long distances primarily by southerly winds in summer months. PM(sub 2.5) events usually share the same origin and transport characteristics as ozone events.
NTIS
Air Quality; Ambience; New Hampshire; Public Health

20080041041 New York State Office of Public Health, Albany, NY, USA
Health Consultation: Holtsville Residential Area, Holtsville, Farmingville, Holbrook and Lake Ronkonkoma Communities, Suffolk County, New York. EPA Facility ID: NYXCRA270000
Dec. 13, 2005; 45 pp.; In English
Report No.(s): PB2008-104058; No Copyright; Avail.: CASI: A03, Hardcopy

In March 1997, the New York State Department of Health (NYS DOH), through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), completed a Health Consultation for Holtsville, Farmingville, Holbrook and Lake Ronkonkoma residential communities, Suffolk County, New York. The Health Consultation reviewed air quality information for these communities (NYS DOH, 1997). Residents of these communities expressed health concerns about odors and air pollution from nearby industrial facilities (Figure 1, Appendix A). The 1997 health consultation categorized the site as an indeterminate public health hazard, the category used by ATSDR when data are insufficient to determine whether humans are, or have been, exposed to contaminants that would be expected to cause adverse health effects. The health consultation made a recommendation and outlined a Public Health Action Plan to define a pattern of reported odors in relation to meteorology and facility operations and traffic status, and at the same time, to conduct air monitoring. That plan was adopted (without collection of information about traffic and industrial operating conditions) and odor complaint logging and air monitoring are ongoing. This health consultation summarizes the complaint triggered one-hour air sampling data collected through June 2003. It also describes general air quality in the area from 1997 to 2002.
NTIS
Air Quality; Health; Lakes; New York; Odors; Residential Areas

20080041044 New Jersey Dept. of Health and Senior Services, Trenton, NJ, USA
Health Consultation: Public Health Implications and Interpretation of Tetrachloroethylene (PCE) Exposure in Ambient and Residential Indoor Air. No. 2. Dover Municipal Well No. 4, Dover Township, Morris County, New Jersey. EPA Facility ID: NJD980654131
Mar. 21, 2006; 18 pp.; In English
Report No.(s): PB2008-104049; No Copyright; Avail.: CASI: A03, Hardcopy

In November 2003, the USA Environmental Protection Agency (USEPA) requested assistance from the Agency for Toxic Substances and Disease Registry (ATSDR) in determining whether elevated indoor air concentrations of tetrachloroethylene (also known as perchloroethylene, or PCE) detected in nine residences located in the vicinity of Joy Cleaners, 272 Route 46, Dover, Morris County, posed an immediate health threat. In response to this request and through a cooperative agreement with the ATSDR, the New Jersey Department of Health and Senior Services (NJDHSS) prepared a health consultation for the Joy

Cleaners site which evaluated PCE concentrations fromtwo sampling events (December 2002 and August 2003) (ATSDR 2005). Based on the highest reported indoor concentrations of PCE, the results indicated that past and future tetrachloroethylene exposures posed potential cancer risks to individuals living at three residences. This health consultation evaluates exposures associated with PCE levels detected during the two ensuing sampling events conducted by the USEPA in February and August 2004. In June 2005, dry cleaning operations at the Joy Cleaners ceased, and the building is scheduled for demolition. As such, present and future exposures associated with site emissions to ambient air have been eliminated.
NTIS
Exposure; Health; New Jersey; Public Health

20080041045 New Jersey Dept. of Health and Senior Services, Trenton, NJ, USA
Health Consultation: Cooper's Poynt Elementary Schoool, Camden, Camden County, New Jersey
Feb. 09, 2005; 45 pp.; In English
Report No.(s): PB2008-104048; No Copyright; Avail.: National Technical Information Service (NTIS)

In December 2003, the New Jersey Department of Environmental Protection requested assistance from the New Jersey Department of Health and Senior Services in assessing potential indoor air exposures from total xylene at the Coopers Poynt Elementary School, Camden, Camden County. This contaminant was thought to be related to a no. 2 fuel oil discharge from an underground storage tank located on school property. Fuel oil is comprised of a complex mixture of petroleum hydrocarbons, including xylenes. The discharge of no. 2 fuel oil from the leaking underground storage tank resulted in the contamination of on-site soil and groundwater, and free product was observed migrating towards the school building in the vicinity of classroom 102 used by pre-kindergarten children. Volatile chemicals in soil and groundwater can emit vapors that may migrate through subsurface soils and into indoor air spaces of overlying buildings. Due to potential vapor intrusion into the school building, indoor air samples were collected in September 2003. The results of this sampling event indicated a number of volatile organic compounds, including elevated concentrations of total xylene.
NTIS
Exposure; Health; New Jersey; Schools; Xylene

20080041048 Agency for Toxic Substances and Disease Registry, Atlanta, GA, USA
Health Consultation: Brush Wellman Elmore Plant (a/k/a Brush Wellman Incorporated), Elmore, Ottawa County, Ohio. EPA Facility ID: OHD004212999. Revised December 1, 2006
Dec. 01, 2006; 75 pp.; In English
Report No.(s): PB2008-104043; No Copyright; Avail.: CASI: A04, Hardcopy

The most frequent community health-related concerns and comments voiced by the community were: off-site migration of beryllium on clothes (so-called worker-take-home), beryllium exposure from air emissions, requests for blood testing with the blood Beryllium Lymphocyte Proliferation Test (BeLPT) for the community, the quality of private well water in residences located near the plant requests for independent air and wipe sampling, and hygiene, housekeeping, and safety at other area companies that work with beryllium-containing materials. These issues are addressed in the main body of this health consultation. Additional community comments and ATSDRs responses are contained in Appendix B. In preparation of this health consultation, ATSDR reviewed the following: results of well water sampling collected and analyzed by OEPA, results of air monitoring performed by Brush Wellman, incident reports from OEPA, correspondence between Brush Wellman and OEPA, wipe sampling information provided by the Ohio Citizen Action, and Brush Wellman policies and procedures.
NTIS
Beryllium; Brushes; Exposure; Health; Lymphocytes; Ohio

20080041049 New York State Dept. of Health, Albany, NY, USA
Health Consultation: Brookhaven Landfil, Town of Brookhaven, Suffolk County, New York. EPA Facility ID: NYD038150264
Nov. 29, 2005; 70 pp.; In English
Report No.(s): PB2008-104042; No Copyright; Avail.: CASI: A04, Hardcopy

The New York State Environmental Facilities Corporation opened the Brookhaven Landfill in March 1974, and the town of Brookhaven assumed ownership of the landfill in 1976. Throughout the history of this site, area residents haveexpressed manyhealth concerns, and the Agency for Toxic Substances and Disease Registry (ATSDR) received a petition for a public health consultation to address these concerns. This resultingpublic health consultation was produced through a cooperative agreement between the New York State Department of Health (NYS DOH) and ATSDR. This document uses existing air and

groundwater data to evaluate the potential for humans to be exposed to contaminants surrounding the Brookhaven Landfill. An ATSDR public health consultation provides advice on specific public health issues that occur as a result of actual or potential human exposure to a hazardous material. People can be exposed to environmental contamination by eating contaminated food, soil, or water (ingestion); breathing contaminated air (inhalation); and directly touching contaminated materials (dermal contact). Public health consultations rely primarily on environmental data, health data, and community concerns to evaluate exposures at a specific site. A public health consultation makes recommendations based on these data and concludes with an outline of site specific public health actions.
NTIS
Health; Landfills; New York; Public Health

20080041050 Agency for Toxic Substances and Disease Registry, Atlanta, GA, USA
Health Consultation: Washington County Air Quality, Marietta, Ohio
Jun. 18, 2007; 30 pp.; In English
Report No.(s): PB2008-104040; No Copyright; Avail.: CASI: A03, Hardcopy

In March 2002, ATSDR staff met with concerned residents about their health concerns and exposure to emissions from a nearby industrial complex. Located several miles outside the City of Marietta, Ohio, a former Union Carbide facility complex is currently occupied by four companies including: Eramet Marietta, Inc. (EMI), Eveready Battery, Solvay Advanced Polymers, and Chevron-Phillips Chemical Company. American Municipal Power (AMP) Ohio, originally built to provide power to Union Carbide, is located across the street from the complex. There is a residential area to the north of the facility. The predominant wind direction in the area is to the northeast. The City of Marietta is located 4 miles northeast of the facility, or 'downwind' (see Appendix A). The residents are most concerned about EMI because of the high volume of metals it refines annually, some facility processes being exempt from more current and more stringent environmental pollution control regulations, and the perception of uncontrolled releases. Residents are also concerned that the other facilities are likely contributing to a 'toxic soup' of contamination that impacts their community, but that EMI is the greatest contributor of air emissions in the area. Area residents are concerned about the impact of the complex on their air quality and their health. They have reported a variety of symptoms, including: headaches, burning eyes, nausea, difficulty breathing, fatigue, muscle aches, tremors, sinus problems, bloody noses, a metallic taste in their mouths, a bitter metallic taste in their throats, an ammonia smell, and sore throats. Residents are also concerned about emissions of hexavalent chromium released through the chromium refining process, emissions from the electro-chromium process, and releases of chlorine and sulfuric acid used in the refining process. Recent information provided by EMI suggests that only small amounts of hexavalent chromium, chlorine, and sulfuric acid are used in its processes. For example, EMI only uses small amounts of chlorine to disinfect treated sanitary wastewater discharging from its sewage treatment plant. Also, sulfuric acid is used only in amounts needed to adjust the pH of recycled process fluids used for leaching raw materials in the electrolytic chromium department. Additionally, EMI's electrolytic chromium process solutions consist primarily of trivalent chromium, because hexavalent chromium in EMI's anolyte solution is reduced to trivalent chromium (less toxic). Because of the level of community concern regarding EMI, ATSDR staff toured the facility in March 2002.
NTIS
Air Pollution; Air Quality; Consulting; Health; Ohio; Pollution Monitoring

20080041084 Naval Postgraduate School, Monterey, CA USA
Afforestation for Improving Valley Urban Air-Quality
Chu, Peter C; Chen, Yuchun; Lu, Shihua; Jan 2005; 11 pp.; In English
Report No.(s): AD-A483192; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483192

Lanzhou is one of the major cities in northwest China and the capital of Gansu Province and located at a narrow (2-8 km width), long (40-km), NW-SE oriented valley basin (elevation: 1,500- 1,600-m) with the Tibetan plateau in the west, Baita mountain (above 1,700-m elevation) in the north, and the Gaolan mountain in the south. Due to topographic and meteorological characteristics, Lanzhou is one of the most polluted cities in China. Meteorological conditions (low winds, stable stratification especially inversion), pollutant sources and sinks affect the air quality. Afforestation changes the mountain-valley local circulation system, destabilizes the atmosphere, and weakens the inversion. Besides, it may absorb some pollutants (sink). Lanzhou local government carried out afforestation and pollutant-source reduction (closing several heavy industrial factories) to improve the air-quality for the past two decades. Numerical model (RAMSHYPACT) simulates the effect of afforestation on the air pollution control.
DTIC
Air Quality; Cities; Contaminants; Forests; Valleys

20080041361 Space Wing (0460th), Buckley, AFB, CO USA

Final Environmental Assessment, Family Camp Facility Buckey Air Force Base, Colorado

Meyer, Elizabeth; Witt, Kimberly; Groenjes, Cheryl; Sherva, Elise; Feb 7, 2008; 136 pp.; In English

Report No.(s): AD-A483770; XC-460SPW; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The US Air Force proposes to construct and operate a new Family Camp (FamCamp) facility adjacent to William's Lake at BAFB, Colorado. Construction of the FamCamp facility will provide outdoor recreational opportunities for the military and civilian workforce stationed at Buckley AFB, retirees, and their families. It will offer camping, fishing, picnicking, trails, playgrounds, and other outdoor activities.

DTIC

Military Air Facilities; Recreation

20080041465 USA Gypsum Co., Chicago, IL, USA

Fate of Mercury in Synthetic Gypsum used for Wallboard Production. Topical Report, Task 6 Wallboard Plant Test Results

Sanderson, J.; Blythe, G. M.; Richardson, M.; Dec. 2006; 39 pp.; In English

Contract(s)/Grant(s): DE-FC26-04NT42080

Report No.(s): DE2007-918423; No Copyright; Avail.: Department of Energy Information Bridge

This report presents and discusses results from Task 6 of the study Fate of Mercury in Synthetic Gypsum Used for Wallboard Production, performed at a full-scale commercial wallboard plant. Synthetic gypsum produced by wet flue gas desulfurization (FGD) systems on coal-fired power plants is commonly used in the manufacture of wallboard. This practice has long benefited the environment by recycling the FGD gypsum byproduct, which is becoming available in increasing quantities, decreasing the need to landfill this material, and increasing the sustainable design of the wallboard product. However, new concerns have arisen as recent mercury control strategies involve the capture of mercury in FGD systems. The objective of this study is to determine whether any mercury is released into the atmosphere when the synthetic gypsum material is used as a feedstock for wallboard production. The project is being co-funded by the U.S. DOE National Energy Technology Laboratory (Cooperative Agreement DE-FC26- 04NT42080), USG Corporation, and EPRI.

NTIS

Gypsum; Mercury (Metal)

20080041466 National Energy Technology Lab., Pittsburgh, PA USA; North Dakota Univ., Grand Forks, ND, USA

JV Task94--Air Quality V: Mercury, Trace Elemnts, SO(sub3), and Particulate Matter Conference. (Final Report, July 1, 2005-June 30, 2007)

Erickson, T. A.; Feb. 2007; 35 pp.; In English

Contract(s)/Grant(s): DE-FC26-98FT40321

Report No.(s): DE2007-918422; No Copyright; Avail.: Department of Energy Information Bridge

This final report summarizes the planning, preparation, facilitation and production, and summary of the conference entitled Air Quality V: Mercury, Trace Elements, SO3, and Particulate Matter, held September 1821, 2005, in Arlington, Virginia. The goal of the conference was to build on the discussions of the first four Air Quality Conferences, providing further opportunity for leading representatives of industry, government, research institutions, academia, and environmental organizations to discuss the key interrelationships between policy and science shaping near-term regulations and controls and to assist in moving forward on emerging issues that will lead to acceptable programs and policies to protect human health, the environment, and economic growth. The conference was extremely timely, as it was the last large conference prior to publication of the U.S. Environmental Protection Agencys final regulations for mercury control from coal-fired utilities, and provided a forum to realistically assess the status of mercury controls in relation to the new regulations.

NTIS

Air Quality; Conferences; Particulates

20080041531 Maryland Univ., Frostburg, MD, USA; Maryland Univ., Frostburg, MD, USA

Contemporary Trends in the Acid-Base Status of the Two Acid-Sensitive Streams in Western Maryland

Eshleman, Keith N.; Kline, Kathleen M.; Morgan, Raymond P., II; Castro, Nancy M.; Negley, Timothy L.; Environmental Science and Technology; 2008; Volume 42, No. 1, pp. 56-61; In English; Original contains black and white illustrations

Contract(s)/Grant(s): CB90-001-002; CB91-001-002; CB92-001-004; CB95-009-002; NNG04GL87G; CR826110-01-0; Copyright; Avail.: Other Sources
ONLINE: http://dx.doi.org/10.1021/es071195e

Recovery of streamwater acid neutralizing capacity (ANC) resulting from declines in regional acid deposition was examined using contemporary (1990-2005) data from two long-term monitoring stations located on the Appalachian Plateau in western Maryland, U.S. Two computational methods were used to estimate daily, monthly, and annual fluxes and discharge-weighted concentrations of ANC, sulfate, nitrate, and base cations over the period of record, and two statistical methods were used to evaluate long-term trends in fluxes and concentrations. The methods used to estimate concentrations, as well as the, statistical techniques, produced very similar results, underlining the robustness of the identified trends. We found clear evidence that streamwater sulfate concentrations have declined at an average rate of about 3 (microns)eq L(exp -1) yr(exp -1) at the two sites due to a 34% reduction in wet atmospheric sulfur deposition. Trends in nitrate concentrations appear to be related to other watershed factors, especially forest disturbance. The best evidence of recovery is based on a doubling of ANC (from 21 to 42 (microns)eq L(exp -1) at the more acid-sensitive site over the 16-year period. A slowing, or possible reversal, in the sulfate, nitrate, and SBC trends is evident in our data and may portend a decline in the rate of--or end to--further recovery.
Author
Acids; Atmospheric Chemistry; Deposition; Streams; Chemical Analysis; Environmental Monitoring; Acid Base Equilibrium; Water Pollution

20080042034 Savannah River National Lab., Aiken, SC, USA
Type AF Certificate for Transportation of Low Enriched Uranium Oxide (Leuo) for Disposal
Opperman, E. K.; Yates, K. R.; Oct. 21, 2007; 7 pp.; In English
Report No.(s): DE2007-918149; No Copyright; Avail.: Department of Energy Information Bridge

Washington Savannah River Company (WSRC) operates the Savannah River Site (SRS) in Aiken, SC under contract with the U.S. Department of Energy (DOE). SRS had the need to ship 227 drums of low enriched uranium oxide (LEUO) to a disposal site. The LEUO had been packaged nearly 25 years ago in U.S. Department of Transportation (DOT) 17C 55-gallon drums and stored in a warehouse. Since the 235U enrichment was just above 1 percent by weight (wt%) the material did not qualify for the fissile material exceptions in 49 CFR 173.453, and therefore was categorized as fissile material for shipping purposes. WSRC evaluated all existing Type AF packages and did not identify any feasible packaging. Applying for a new Type AF certificate of compliance was considered too costly for a one-time/one-way shipment for disposal. Down-blending the material with depleted uranium (to reduce enrichment below 1 wt% and enable shipment as low specific activity (LSA) radioactive material) was considered, but appropriate blending facilities do not exist at SRS. After reviewing all options, WSRC concluded that seeking a DOT Special Permit was the best option to enable shipment of the material for permanent disposal. WSRC submitted the Special Permit application to the DOT, and after one request-for-additional-information (RAI) the permit was considered acceptable. However, in an interesting development that resulted from the DOT Special Permit application process, it was determined that it was more appropriate for the DOE to issue a Type AF certificate for this shipping campaign. This paper will outline the DOT Special Permit application and Type AF considerations, and will discuss the issuance of the new DOE Type AF certificate of compliance.
NTIS
Certification; Radioactive Wastes; Transportation; Uranium Oxides

20080042038 Westinghouse Savannah River Co., Aiken, SC, USA; Nuclear Filter Technology, Inc., Golden, CO, USA
Development and Testing of the Blanton Clamshell Closure for Use on Radioactive Material Packaging Drums
Blanton, P. S.; Wickland, T.; Klebba, H.; Oct. 2007; 11 pp.; In English
Contract(s)/Grant(s): DE-AC09-96SR18500
Report No.(s): DE2007-918147; WSRC-STI-2007-00591; No Copyright; Avail.: National Technical Information Service (NTIS)

This paper provides a brief history of the U.S. Type B 6M specification container, its introduction into U.S. Code of federal regulations and its scheduled elimination three decades later. The paper also presents development, testing and deployment by the Department of Energy (DOE) of an enhanced drum closure called the Blanton Clamshell (patent pending) that was designed to replace the standard open-head C-ring closure for the 55- and 85-gallon drums described in the 6M specification to extend their safe use. Nuclear Filter Technology has the Exclusive License for Clamshell production. Drum packages utilizing the standard C-ring closure have been a main-stay for over a half of a century in the national and international nuclear industry for shipping radioactive materials and will remain so in the foreseeable future. Drum package

use in the U.S. increased heavily in the 1950s with development of the Weapons Complex and subsequently the commercial nuclear reactor industry.
NTIS
Closures; Drums (Containers); Packaging; Radioactive Materials

20080042074 Oak Ridge National Lab., TN USA; Westinghouse Savannah River Co., Aiken, SC, USA
Technical and Regulatory Considerations in Using Freight Containers as Industrial Packages
Hawk, M.; Opperman, E.; Natali, R. B.; Oct. 2007; 10 pp.; In English
Contract(s)/Grant(s): DE-AC09-96SR18500
Report No.(s): DE2007-918143; SED-ESV-2007-0006; No Copyright; Avail.: Department of Energy Information Bridge

The USA (US) Department of Energy (DOE), Office of Environmental Management (EM), is actively pursuing activities to reduce the radiological risk and clean up the environmental legacy of the nations nuclear weapons programs. EM has made significant progress in recent years in the clean-up and closure of sites and is also focusing on longer-term activities necessary for the completion of the clean-up program. The packaging and transportation of contaminated demolition debris and low-level waste (LLW) materials in a safe and cost-effective manner are essential in completing this mission. Toward this end, the US Department of Transportations (DOT) Final Rule on Hazardous Materials Regulation Final Rule issued January 26, 2004, included a new provision authorizing the use of Freight Containers (e.g., 20 and 40-foot ISO Containers) as Industrial Packages Type 1, 2, or 3 (IP-1, IP-2, and IP-3). This paper will discuss the technical and regulatory considerations in using these newly authorized and large packages for the packaging and transportation of LLW materials.
NTIS
Cargo; Packaging; Radioactive Wastes; Risk Assessment

20080042138 New Jersey Dept. of Health and Senior Services, Trenton, NJ, USA
Health Consultation: Tops 'N' Town Cleaners Site, Englishtown, Monmouth County, New Jersey. EPA Facility ID: NJR000008193
May 24, 2006; 67 pp.; In English
Report No.(s): PB2008-104080; No Copyright; Avail.: National Technical Information Service (NTIS)

As part of an October 2002 remedial investigation of a leaking underground storage tank at a Mobil gas station located on Route 9, Manalapan Township, Monmouth County, environmental samples were collected from the adjacent Gordons Corner Shopping Center. Tops N Town Cleaners was one of the businesses located in the shopping center, and tetrachloroethylene, also known as perchloroethylene or PCE, was used in its daily dry cleaning operation. Elevated PCE concentrations were detected in the basement at the northern end of the shopping center; subsequent environmental sampling results indicated elevated PCE concentrations in ambient and indoor air, soil gas, and groundwater. Monthly sampling of shopping center businesses was initiated in January 2003, with results indicating continued elevated PCE concentrations in the indoor air.
NTIS
Cleaners; Consulting; Health; Indoor Air Pollution; New Jersey

20080042139 Agency for Toxic Substances and Disease Registry, Atlanta, GA, USA
Health Consultation: Sunoco Refinery, City of Oregon, Lucas County, Ohio. EPA Facility ID: OHD005046511
Aug. 01, 2005; 37 pp.; In English
Report No.(s): PB2008-104079; No Copyright; Avail.: National Technical Information Service (NTIS)

The Agency for Toxic Substances and Disease Registry (ATSDR) was petitioned by a resident of Oregon, Ohio to assess the potential health impact on area residents from exposure to air emissions from the Sunoco Refinery (Sun). The Sunoco Refinery is located in the cities of Toledo and Oregon in Lucas County, Ohio. The area surrounding the site is mixed industrial and residential, including heavy industry, light industry, residences, schools, commercial areas, railroad tracks, and major highways. The facility is composed of two main sections; one contains operating equipment and machinery used to refine crude oil to produce gasoline and to store petroleum products. The other section, southeast of the first section, is a tank farm that is used to store large quantities of gasoline and other petroleum products.
NTIS
Air Pollution; Consulting; Health; Ohio; Sun

20080042140 Ohio Dept. of Health, Columbus. Health Assessment Section, Columbus, OH, USA

Health Consultation: Lanxess Inc., Facility (Air Emissions), Addyston, Hamilton County, Ohio. EPA Facility ID: OHD004233003

Sep. 05, 2007; 13 pp.; In English

Report No.(s): PB2008-104063; No Copyright; Avail.: CASI: A03, Hardcopy

The Ohio Department of Health (ODH) Health Assessment Section (HAS) and the Ohio Environmental Protection Agency (Ohio EPA) Division of Air Pollution Control were asked by the Hamilton County General Health District to evaluate the public health threat posed by the unintentional releases of the chemicals acrylonitrile, styrene, and 1,3 butadiene to the environment from the Lanxess, Inc. facility in Addyston, Ohio. The company, located at 356 Three Rivers Parkway in Addyston, Ohio, operates various continuous plastic polymerization units that use acrylonitrile, 1,3-butadiene, and styrene (ABS) to make plastic products. These processes routinely release the above chemicals into the air, which included three accidental releases of these chemicals into the environment during late 2004 and early 2005. The primary public health concern was the potential exposure of children at the nearby Meredith Hitchens Elementary School to these chemicals during these events. In the report, released on May 20, 2005, ODH and Ohio EPA estimated the concentrations of these chemicals and recommended ambient air monitoring near the facility.

NTIS

Health; Ohio; Polymerization

20080042141 Brookhaven Science Associates, Upton, NY, USA

Aerosol Mobility Size Spectrometer

Wang, J., Inventor; Kulkarni, P., Inventor; 30 Dec 04; 13 pp.; In English

Contract(s)/Grant(s): DE-AC02-98GH10886

Patent Info.: Filed Filed 30 Dec 04; US-Patent-Appl-SN-11-026 726

Report No.(s): PB2008-104539; No Copyright; Avail.: CASI: A03, Hardcopy

A device for measuring aerosol size distribution within a sample containing aerosol particles. The device generally includes a spectrometer housing defining an interior chamber and a camera for recording aerosol size streams exiting the chamber. The housing includes an inlet for introducing a flow medium into the chamber in a flow direction, an aerosol injection port adjacent the inlet for introducing a charged aerosol sample into the chamber, a separation section for applying an electric field to the aerosol sample across the flow direction and an outlet opposite the inlet. In the separation section, the aerosol sample becomes entrained in the flow medium and the aerosol particles within the aerosol sample are separated by size into a plurality of aerosol flow streams under the influence of the electric field. The camera is disposed adjacent the housing outlet for optically detecting a relative position of at least one aerosol flow stream exiting the outlet and for optically detecting the number of aerosol particles within the at least one aerosol flow stream.

NTIS

Aerosols; Mobility; Patent Applications; Size Distribution; Spectrometers

20080042157 Ohio Dept. of Health, Columbus. Health Assessment Section, Columbus, OH, USA

Health Consultation: Warren Township Cistern Sampling Investigation, Washington County, Ohio

Jul. 18, 2005; 19 pp.; In English

Report No.(s): PB2008-104081; No Copyright; Avail.: CASI: A03, Hardcopy

On May 22, 2000, the Agency for Toxic Substances and Disease Registry (ATSDR) was petitioned by U.S. Senator Mike DeWine to evaluate the health impacts from air pollution on residents of Marietta, Washington County, Ohio. At that time, no data were available for review to address the petition. In 2001-2002 ambient air monitoring data, supplied by the Ohio Environmental Protection Agency (OEPA), became available to ATSDR in late March, 2003. The Atlanta-based ATSDR Strike Team was asked to evaluate the 2001-2002 ambient air data and determine if exposure to ambient air concentrations of metals are of health concern or warrant additional evaluation.

NTIS

Air Pollution; Consulting; Health; Metals; Ohio; Sampling

20080042262 Geological Survey, Reston, VA USA

External Quality Assurance Programs Managed by the U.S. Geological Survey in Support of the National Atmospheric Deposition Program/Mercury Deposition Network

Latysh, N. E.; Wetherbee, G. A.; January 2007; 40 pp.; In English

Report No.(s): PB2008-104453; USGS-OFR-2007-1170; No Copyright; Avail.: National Technical Information Service (NTIS)

The U.S. Geological Survey (USGS) Branch of Quality Systems operates external quality assurance programs for the National Atmospheric Deposition Program/Mercury Deposition Network (NADP/MDN). Beginning in 2004, three programs have been implemented: the system blank program, the interlaboratory comparison program, and the blind audit program. Each program was designed to measure error contributed by specific components in the data-collection process. The system blank program assesses contamination that may result from sampling equipment, field exposure, and routine handling and processing of the wet-deposition samples. The interlaboratory comparison program evaluates bias and precision of analytical results produced by the Mercury Analytical Laboratory (HAL) for the NADP/MDN, operated by Frontier GeoSciences, Inc. The HALs performance is compared with the performance of five other laboratories. The blind audit program assesses bias and variability of MDN data produced by the HAL using solutions disguised as environmental samples to ascertain true laboratory performance. This report documents the implementation of quality assurance procedures for the NADP/MDN and the operating procedures for each of the external quality assurance programs conducted by the USGS. The USGS quality assurance information provides a measure of confidence to NADP/MDN data users that measurement variability is distinguished from environmental signals.

NTIS

Acid Rain; Air Pollution; Air Sampling; Atmospheric Composition; Deposition; Geological Surveys; Mercury (Metal); Quality Control

20080042282 Agency for Toxic Substances and Disease Registry, Atlanta, GA, USA

Health Consultation: Weyerhaeuser Company Plymouth Wood Treating Plant, Plymouth, Martin County, North Carolina. EPA Facility ID: NCD991278540

Oct. 17, 2003; 10 pp.; In English

Report No.(s): PB2008-104082; No Copyright; Avail.: National Technical Information Service (NTIS)

The North Carolina Department of Health and Human Services (NCDHHS) modeled air emissions of hydrogen sulfide from the Weyerhaeuser Companys pulp and paper mill in Plymouth, North Carolina. NCDHHS provided ATSDR with the summary results of the modeled results and asked ATSDR if the data indicated a potential public health hazard to residents in the communities surrounding the facility.

NTIS

Air Pollution; Health; Hydrogen Sulfide; North Carolina; Wood

46
GEOPHYSICS

Includes Earth structure and dynamics, aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism. For related information see *47 Meteorology and Climatology*; and *93 Space Radiation*.

20080040845 Multidisciplinary Center for Earthquake Engineering Research, Buffalo, NY, USA

Hazard Mitigation Strategy and Monitoring Technologies for Urban and Infrastructure Public Buildings: Proceedings of the China-US Workshops (on CD-ROM)

Dec. 12, 2007; In English

Report No.(s): PB2008-500018; No Copyright; Avail.: National Technical Information Service (NTIS)

This CD-ROM contains papers, photos and movies from two US-China workshops on multi-hazard mitigation strategies for large public buildings and other infrastructure. The first workshop on ‘Protection of Urban Infrastructure and Public Buildings Against Earthquakes and Manmade Disasters’ was held in 2003 and featured sixty papers. Discussion focused on the use of advanced technologies in critical public buildings and transportation networks to protect them from damage due to earthquakes and other hazards. A follow-up workshop was carried out in 2005, where participants presented state-of-the-art research related to multiple hazards resilient critical facilities. Topics of fifteen papers given included structural health

monitoring, design structural strength under multiple hazard loadings, indoor air quality and safety monitoring, structural damage detection and response control, multiple hazard risk analysis and evacuation systems.
NTIS
CD-ROM; China; Cities; Conferences; Earthquakes; Hazards; United States

20080040988 NASA, Washington, DC, USA
Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008
Bleamaster, Leslie F., III, Editor; Tanaka, Kenneth L., Editor; Kelley, Michael S., Editor; June 2008; 86 pp.; In English; Annual Planetary Geologic Mappers Meeting, 23-26 Jun. 2008, Flagstaff, AZ, USA; See also 20080040989 - 20080041025; Original contains color and black and white illustrations
Contract(s)/Grant(s): NNH08AH551
Report No.(s): NASA/CP-2008-215469; Copyright; Avail.: CASI: A05, Hardcopy

Topics discussed include: Merging of the USGS Atlas of Mercury 1:5,000,000 Geologic Series; Geologic Mapping of the V-36 Thetis Regio Quadrangle: 2008 Progress Report; Structural Maps of the V-17 Beta Regio Quadrangle, Venus; Geologic Mapping of Isabella Quadrangle (V-50) and Helen Planitia, Venus; Renewed Mapping of the Nepthys Mons Quadrangle (V-54), Venus; Mapping the Sedna-Lavinia Region of Venus; Geologic Mapping of the Guinevere Planitia Quadrangle of Venus; Geological Mapping of Fortuna Tessera (V-2): Venus and Earth's Archean Process Comparisons; Geological Mapping of the North Polar Region of Venus (V-1 Snegurochka Planitia): Significant Problems and Comparisons to the Earth's Archean; Venus Quadrangle Geological Mapping: Use of Geoscience Data Visualization Systems in Mapping and Training; Geologic Map of the V-1 Snegurochka Planitia Quadrangle: Progress Report; The Fredegonde (V-57) Quadrangle, Venus: Characterization of the Venus Midlands; Formation and Evolution of Lakshmi Planum (V-7), Venus: Assessment of Models using Observations from Geological Mapping; Geologic Map of the Meskhent Tessera Quadrangle (V-3), Venus: Evidence for Early Formation and Preservation of Regional Topography; Geological Mapping of the Lada Terra (V-56) Quadrangle, Venus: A Progress Report; Geology of the Lachesis Tessera Quadrangle (V-18), Venus; Geologic Mapping of the Juno Chasma Quadrangle, Venus: Establishing the Relation Between Rifting and Volcanism; Geologic Mapping of V-19, V-28, and V-53; Lunar Geologic Mapping Program: 2008 Update; Geologic Mapping of the Marius Quadrangle, the Moon; Geologic Mapping along the Arabia Terra Dichotomy Boundary: Mawrth Vallis and Nili Fossae, Mars: Introductory Report; New Geologic Map of the Argyre Region of Mars; Geologic Evolution of the Martian Highlands: MTMs -20002, -20007, -25002, and -25007; Mapping Hesperia Planum, Mars; Geologic Mapping of the Meridiani Region, Mars; Geology of Holden Crater and the Holden and Ladon Multi-Ring Impact Basins, Margaritifer Terra, Mars; Geologic Mapping of Athabasca Valles; Geologic Mapping of MTM -30247, -35247 and -40247 Quadrangles, Reull Vallis Region of Mars; Geologic Mapping of the Martian Impact Crater Tooting; Geology of the Southern Utopia Planitia Highland-Lowland Boundary Plain: First Year Results and Second Year Plan; Mars Global Geologic Mapping: Amazonian Results; Recent Geologic Mapping Results for the Polar Regions of Mars; Geologic Mapping of the Medusae Fossae Formation on Mars (MC-8 SE and MC-23 NW) and the Northern Lowlands of Venus (V-16 and V-15); Geologic Mapping of the Zal, Hi'iaka, and Shamshu Regions of Io; Global Geologic Map of Europa; Material Units, Structures/Landforms, and Stratigraphy for the Global Geologic Map of Ganymede (1:15M); and Global Geologic Mapping of Io: Preliminary Results.
Derived from text
Geological Surveys; Planetary Geology; Planetary Mapping; Planetary Surfaces; Thematic Mapping; Topography; Geophysics; Structural Basins; Venus Surface

20080040989 Planetary Science Inst., Tucson, AZ, USA
Geologic Mapping of the Guinevere Planitia Quadrangle of Venus
Crown, David A.; Stofan, Ellen R.; Bleamaster, Leslie F., III; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The Guinevere Planitia quadrangle of Venus (0-25degN, 300-330deg) covers a lowland region east of Beta Regio and west of Eistla Regio, including parts of Guinevere and Undine Planitiae. The V-30 quadrangle is dominated by low-lying plains interpreted to be of volcanic origin and exhibiting numerous wrinkle ridges. Using Pioneer Venus, Goldstone, and Arecibo data, previous investigators have described radar bright, dark, and mottled plains units in the Guinevere Planitia region, as well as arcuate fracture zones and lineament belt segments that define the Beta-Eistla deformation zone [1-5]. Magellan SAR images show that volcanic landforms compose the majority of the surface units in V-30 [6-7]. The quadrangle contains parts of four major volcanoes: Atanua (9degN, 307deg), Rhpisunt (3degN, 302deg), Tuli (13degN, 314deg), and Var (3degN, 316deg) Montes, and three coronae: Hulda (12degN, 308deg), Madderakka (9degN, 316deg), and Poloznitsa (1degN,

303deg). Seymour crater, located at 18degN, 327deg, is associated with extensive crater outflow deposits.
Derived from text
Venus Surface; Geological Surveys; Planetary Mapping; Synthetic Aperture Radar; Radar Imagery; Volcanoes; Structural Properties (Geology)

20080040990 Planetary Science Inst., Tucson, AZ, USA
Geologic Mapping along the Arabia Terra Dichotomy Boundary: Mawrth Vallis and Nili Fossae, Mars: Introductory Report
Bleamaster, Leslie F., III; Crown, David A.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Geologic mapping studies at the 1:1M-scale will be used to characterize geologic processes that have shaped the highlands along the Arabia Terra dichotomy boundary. In particular, this mapping will evaluate the distribution, stratigraphic position, and lateral continuity of compositionally distinct outcrops in Mawrth Vallis and Nili Fossae as identified by spectral instruments currently in orbit. Placing these landscapes, their material units, structural features, and unique compositional outcrops into spatial and temporal context with the remainder of the Arabia Terra dichotomy boundary will provide the ability to: 1) further test original dichotomy formation hypotheses, 2) constrain ancient paleoenvironments and climate conditions, and 3) evaluate various fluvial-nival modification processes related to past and present volatile distribution and their putative reservoirs (aquifers, lakes and oceans, surface and ground ice) and the influences of nearby volcanic and tectonic features on hydrologic processes in these regions. The result will be two 1:1M scale geologic maps of twelve MTM quadrangles (Mawrth Vallis - 20022, 20017, 20012, 25022, 25017, and 25012; and Nili Fossae - 20287, 20282, 25287, 25282, 30287, 30282).
Derived from text
Dichotomies; Geological Surveys; Planetary Mapping; Tectonics; Stratigraphy; Highlands

20080040991 Brown Univ., Providence, RI, USA
Geological Mapping of Fortuna Tessera (V-2): Venus and Earth's Archean Process Comparisons
Head, James W.; Hurwitz,D. M.; Ivanov, M. A.; Basilevsky, A. T.; Kumar, P. Senthil; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The geological features, structures, thermal conditions, interpreted processes, and outstanding questions related to both the Earth's Archean and Venus share many similarities and we are using a problem-oriented approach to Venus mapping, guided by insight from the Archean record of the Earth, to gain new insight into the evolution of Venus and Earth's Archean. The Earth's preserved and well-documented Archean record provides important insight into high heat-flux tectonic and magmatic environments and structures and the surface of Venus reveals the current configuration and recent geological record of analogous high-temperature environments unmodified by subsequent several billion years of segmentation and overprinting, as on Earth. Elsewhere we have addressed the nature of the Earth's Archean, the similarities to and differences from Venus, and the specific Venus and Earth-Archean problems on which progress might be made through comparison. Here we present the major goals of the Venus-Archean comparison and show how preliminary mapping of the geology of the V-2 Fortuna Tessera quadrangle is providing insight on these problems. We have identified five key themes and questions common to both the Archean and Venus, the assessment of which could provide important new insights into the history and processes of both planets.
Derived from text
Venus (Planet); High Temperature Environments; Planetary Evolution; Thematic Mapping; Geology; Segments; Tectonics; Venus Surface

20080040992 Arizona Univ., Tucson, AZ, USA
New Geologic Map of the Argyre Region of Mars
Dohm, J. M.; Tanaka, K. L.; Hare, T. M.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The new generation of Mars orbital topographic and imaging data justifies a new mapping effort of the Argyre impact basin and surroundings (-30.0deg to -65.0deg lat., -20.0deg to -70.0deg long; Fig.1). Our primary objective is to produce a geologic map of the Argyre region at 1:5,000,000 scale in both digital and print formats. The map will detail the stratigraphic

and crosscutting relations among rock materials and landforms. These include Argyre basin infill, impact crater rim materials and adjoining highland materials of Noachis Terra, valleys and elongated basins that are radial and concentric about the primary Argyre basin, faults, enigmatic ridges, lobate debris aprons, and valley networks. Such information will be useful to the planetary science community for constraining the regional geology, paleohydrology, and paleoclimate. This includes the assessment of: (a) whether the Argyre basin contained lakes [1], (b) the extent of reported flooding and glaciation, which includes ancient flows of volatiles into the impact basin [2-4], (c) existing interpretations of the origin of the narrow ridges located in the southeast part of the basin floor [2,5], and (d) the extent of Argyre-related tectonism and its influence on the surrounding regions. Whereas the geologic mapping investigation of Timothy Parker focuses on the Argyre floor materials at 1:1,000,000 (MTMs -50036, -50043, -55036, -55043; see Fig. 1 for approximate corners of the area), our regional geologic mapping investigation includes the Argyre basin floor and rim materials, the transition zone that straddles the Thaumasia plateau, which includes Argyre impact-related modification [6], and the southeast margin of the Thaumasia plateau using important new data sets (Fig. 1). Our mapping effort will incorporate the map information of Parker if it is made available during the project.
Derived from text
Mars Surface; Geological Surveys; Planetary Mapping; Highlands; Tectonics; Stratigraphy; Plateaus

20080040994 Smithsonian Institution, Washington, DC, USA
Mapping the Sedna-Lavinia Region of Venus
Campbell, Bruce A.; Anderson, Ross F.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Geologic mapping of Venus at 1:5 M scale has shown in great detail the flow complexes of volcanoes, coronae, and shield fields, and the varying structural patterns that differentiate tesserae from corona rims and isolated patches of densely lineated terrain. In most cases, however, the lower-elevation plains between the higher-standing landforms are discriminated only on the basis of potentially secondary features such as late-stage lava flooding or tectonic overprinting. This result, in which volcanoes and tesserae appear as 'islands in the sea,' places weak constraints on the relative age of large upland regions and the nature of the basement terrain. In this work, we focus on the spatial distribution and topography of densely lineated and tessera units over a large region of Venus, and their relationship to apparently later corona and shield flow complexes. The goal is to identify likely connections between patches of deformed terrain that suggest earlier features of regional extent, and to compare the topography of linked patches with other such clusters as a guide to whether they form larger tracts beneath the plains. Mapping Approach. We are mapping the region from 57S to 57N, 300E-60E. Since the 1:5 M quadrangles emphasize detail of tessera structure and corona/edifice flows, we simply adopt the outlines of these features as they relate to the outcrops of either 'densely lineated terrain' or tessera (Fig. 1). The densely lineated material is mapped in many quadrangles based on pervasive structural deformation, typically with a single major axis (in contrast to the overlapping orthogonal patterns on tesserae). This unit definition is often extended to include material of corona rims. We do not at present differentiate between plains units, since earlier efforts show that their most defining attributes may be secondary to the original emplacement (e.g., lobate or sheet-like flooding by thin flow units, tectonic patterns related to regional and localized stress regimes) [1].
Derived from text
Planetary Mapping; Venus Surface; Spatial Distribution; Geological Surveys; Flow Distribution; Volcanoes; Topography; Tectonics; Coronas

20080040996 Brown Univ., Providence, RI, USA
Venus Quadrangle Geological Mapping: Use of Geoscience Data Visualization Systems in Mapping and Training
Head, James W.; Huffman, J. N.; Forsberg, A. S.; Hurwitz, D. M.; Basilevsky, A. T.; Ivanov, M. A.; Dickson, J. L.; Kumar, P. Senthil; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Copyright; Avail.: CASI: A01, Hardcopy

We are currently investigating new technological developments in computer visualization and analysis in order to assess their importance and utility in planetary geological analysis and mapping [1,2]. Last year we reported on the range of technologies available and on our application of these to various problems in planetary mapping [3]. In this contribution we focus on the application of these techniques and tools to Venus geological mapping at the 1:5M quadrangle scale. In our current Venus mapping projects we have utilized and tested the various platforms to understand their capabilities and assess their usefulness in defining units, establishing stratigraphic relationships, mapping structures, reaching consensus on interpretations and producing map products. We are specifically assessing how computer visualization display qualities (e.g.,

level of immersion, stereoscopic vs. monoscopic viewing, field of view, large vs. small display size, etc.) influence performance on scientific analysis and geological mapping. We have been exploring four different environments: 1) conventional desktops (DT), 2) semi-immersive Fishtank VR (FT) (i.e., a conventional desktop with head-tracked stereo and 6DOF input), 3) tiled wall displays (TW), and 4) fully immersive virtual reality (IVR) (e.g., 'Cave Automatic Virtual Environment,' or Cave system). Formal studies demonstrate that fully immersive Cave environments are superior to desktop systems for many tasks [e.g., 4].
Derived from text
Venus Surface; Planetary Mapping; Scientific Visualization; Thematic Mapping; Virtual Reality; Caves; Computer Techniques; Geophysics; Reliability Analysis; Stratigraphy

20080040998 Geological Survey, Flagstaff, AZ, USA
Geology of the Southern Utopia Planitia Highland-Lowland Boundary Plain: First Year Results and Second Year Plan
Skinner, J. A., Jr.; Tanaka, K. L.; Hare, T. M.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The southern Utopia highland-lowland boundary (HLB) extends >1500 km westward from northern Nepenthes Mensae to the topographic saddle that separates Isidis and Utopia Planitiae. It contains bench-like platforms that contain depressions, pitted cones (some organized into arcuate chains and thumbprint terrain), isolated domes, lineated depressions, buried circular depressions, ring fractures, polygonal fractures, and other locally- to regionally-dispersed landforms [1]. The objective of our mapping project is to clarify the geologic evolution of the southern Utopia Planitia HLB by identifying the geologic, structural, and stratigraphic relationships of surface materials in MTMs 10237, 15237, 20237, 10242, 15242, 20242, 10247, 15247, and 20247.
Derived from text
Boundaries; Stratigraphy; Mars Surface; Highlands; Topography; Terrain; Surface Properties

20080040999 Smithsonian Institution, Washington, DC, USA
Geologic Mapping of the Medusae Fossae Formation on Mars (MC-8 SE and MC-23 NW) and the Northern Lowlands of Venus (V-16 and V-15)
Zimbelman, J. R.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color and black and white illustrations
Contract(s)/Grant(s): NNX07AP42G; Copyright; Avail.: CASI: A01, Hardcopy

This report summarizes the status of a mapping project supported by NASA grant NNX07AP42G, funding for which became available on July 18, focusing on the mapping of the Medusae Fossae Formation (MFF) on Mars. The report also briefly discusses the status of maps of Venus and Ascraeus Mons, begun under previous NASA grants but which are still in progress.
Derived from text
Geological Surveys; Planetary Mapping; Mars Volcanoes; Sediments; Igneous Rocks; Mars Photographs; Geology

20080041000 Academy of Sciences (Russia), Moscow, Russian Federation
Geologic Mapping of the V-36 Thetis Regio Quadrangle: 2008 Progress Report
Basilevsky, A. T.; Head, James W.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

As a result of mapping, eleven material stratigraphic units and three structural units have been identified and mapped. The material units include (from older to younger): tessera terrain material (tt), material of densely fractured plains (PDF), material of fractured and ridged plains (pfr), material of shield plains (psh), material of plains with wrinkle ridges (pwr), material of smooth plains of intermediate brightness (psi), material of radardark smooth plains (psd), material of lineated plains (pli) material of lobate plains (plo), material of craters having no radar-dark haloes (c1), and material of craters having clear dark haloes (c2). The morphologies and probably the nature of the material units in the study area are generally similar to those observed in other regions of Venus [2]. The youngest units are lobate plains (plo) which here typically look less lobate than in other areas of the planet. Close to them in age are smooth plains which are indeed smooth and represented by two varieties mentioned above. Lineated plains (pli) are densely fractured in a geometrically regular way. Plains with wrinkle ridges, being morphologically similar to those observed in other regions, here occupy unusually small areas. Shield (psh) plains here are

also not abundant. Locally they show wrinkle ridging. Fractured and ridged plains (pfr), which form in other regions, the so called ridge belts, are observed as isolated areas of clusters of ridged plains surrounded by other units. Densely fractured plains (PDF) are present in relatively small areas in association with coronae and corona-like features. Tessera terrain (tt) is dissected by structures oriented in two or more directions. Structures are so densely packed that the morphology (and thus nature) of the precursor terrain is not known. Structural units include tessera transitional terrain (ttt), fracture belts (fb) and rifted terrain (rt). Tessera transitional terrain was first identified and mapped by [4] as areas of fractured and ridged plains (pfr) and densely fractured plains (PDF) deformed by transverse faults that made it formally resemble tessera terrain (tt). The obvious difference between units tt and ttt is the recognizable morphology of precursor terrain of unit ttt. Fracture belts are probably ancient rift zones [3]. Rifted terrain (rt), as in other regions of Venus, is so saturated with faults that according to the recommendation of [1, 5] it should be mapped as a structural unit.
Derived from text
Geological Surveys; Venus Surface; Planetary Mapping; Stratigraphy; Terrain; Brightness

20080041001 Planetary Science Inst., Tucson, AZ, USA
Geologic Mapping of Isabella Quadrangle (V-50) and Helen Planitia, Venus
Bleamaster, Leslie F., III; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

(25-50 S, 180-210 E) is host to numerous coronae and small volcanic centers (paterae and shield fields), focused (Aditi and Sirona Dorsa) and distributed (penetrative north-south trending wrinkle ridges) contractional deformation, and radial and linear extensional structures, all of which contribute materials to and/or deform the expansive surrounding plains (Nsomeka and Wawalag Planitiae). Regional plains, which are a northern extension of regional plains mapped in the Barrymore Quadrangle V-59 [1], dominate the V-50 quadrangle. Previous mapping divided the regional plains into two members: regional plains, members a and b [2]. A re-evaluation of these members has determined that a continuous and consistent unit contact does not exist; however, the majority of this radar unit or surficial unit will still be displayed on the final map as a stipple pattern as it is a prevalent feature of the quadrangle. With minimal tessera or highland material, much of the quadrangle s oldest materials are plains units (the regional plains). Much of these plains are covered with small shield edifices that exhibit a variety of material contributions (or flows). In the northwest, several flows emerge and flow to the southeast from Diana-Dali Chasmata. Local corona- and mons-fed flows superpose the regional plains; however, earlier stages of volcano-tectonic centers marked by arcuate and radial structural elements, including terrain so heavily deformed that it takes on a new appearance, may have developed prior to or concurrently with the region plains. Northtrending deformation belts disrupt the central portion of the map area and wrinkle ridges parallel these larger belts. Isabella crater, in the northeastern quadrant, is highly asymmetric and displays two prominent ejecta blanket morphologies, which generally correlate with distance from the impact structure suggesting that ejecta block size or ejecta blanket thickness may be the cause. The crater floor is very dark and shows no direct connection with the large outflow to the south, which emphasizes the asymmetry observed. Isabella crater ejecta and outflow materials clearly postdate several small craters in the vicinity.
Derived from text
Planetary Geology; Geological Surveys; Quadrants; Tectonics; Planetary Mapping; Ejecta; Highlands

20080041003 Buffalo Univ., NY, USA
Mapping Hesperia Planum, Mars
Gregg, Tracy K. P.; Crown, David A.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Hesperia Planum, characterized by a high concentration of mare-type wrinkle ridges and ridge rings [1-4], encompasses > 2 million km2 in the southern highlands of Mars (Fig. 1). The most common interpretation is that the plains were emplaced as flood lavas with total thicknesses of <3 km [4-10]. The wrinkle ridges on its surface make Hesperia Planum the type locale for Hesperian-aged ridged plains on Mars [e.g., 9], and recent investigations reveal that wrinkle-ridge formation occurred in more than one episode [4]. Hesperia Planum s stratigraphic position and crater-retention age [e.g., 9, 11-12] define the base of the Hesperian System. However, preliminary results of geologic mapping reveal that the whole of Hesperia Planum is unlikely to be composed of the same materials, emplaced at the same geologic time. To unravel these complexities, we are generating a 1:1.5M-scale geologic map of Hesperia Planum and its surroundings (Fig. 1). To date, we have identified 4 distinct plains units within Hesperia Planum and are attempting to determine the nature and relative ages of these materials (Fig. 2) [13-15].
Derived from text
Geochronology; Geological Surveys; Planetary Mapping; Planetary Geology; Mars Surface; Highlands; Stratigraphy

20080041004 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Geologic Mapping of MTM -30247, -35247 and -40247 Quadrangles, Reull Vallis Region of Mars

Mest, S. C.; Crown, D. A.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Copyright; Avail.: CASI: A01, Hardcopy

Geologic mapping and stratigraphic analyses of MTM -30247, -35247, and -40247 quadrangles are being used to characterize the Reull Vallis (RV) system and to determine the history of the eastern Hellas region of Mars. Studies of RV examine the roles and timing of volatile-driven erosional and depositional processes and provide constraints on potential associated climatic changes. This study complements earlier investigations of the eastern Hellas region, including regional analyses [1-6], mapping studies of circum-Hellas canyons [7-10], and volcanic studies of Hadriaca and Tyrrhena Paterae [11-13]. Key scientific objectives for these quadrangles include 1) characterization of RV in its 'fluvial zone,' 2) analysis of channels in the surrounding plains and potential connections to and interactions with RV, 3) examination of young (?), presumably sedimentary plains along RV that embay the surrounding highlands, and 4) determination of the nature of the connection between segments 1 and 2 of RV.

Derived from text

Planetary Geology; Stratigraphy; Geological Surveys; Highlands; Planetary Mapping; Mars Surface; Erosion

20080041005 Smithsonian Institution, Washington, DC, USA

Geology of Holden Crater and the Holden and Ladon Multi-Ring Impact Basins, Margaritifer Terra, Mars

Irwin, R. P., III; Grant, J. A.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Geologic mapping at 1:500K scale of Mars quads 15s027, 20s027, 25s027, and 25s032 (Fig. 1) is in progress to constrain the geologic and geomorphic history of southwestern Margaritifer Terra. This work builds on earlier maps at 1:5M [1] and 1:15M scales [2], recent to concurrent 1:500Kscale mapping of adjacent areas to the east [3-5], and studies of drainage basin evolution along the Uzboi-Ladon-M (ULM; the third valley in the sequence has no formal name) Valles basin overflow system and nearby watersheds [6-9]. Two of the six landing sites under consideration for the Mars Science Laboratory rover are in this map area, targeting finely layered, phyllosilicate-rich strata and alluvial fans in Holden crater [10-12] (26degS, 34degW, 150 km diameter) or deposits southeast of a likely delta in Eberswalde crater [13-16] (24degS, 33degW, 50 km in diameter). Diverse processes including larger and smaller impacts, a wide range in fluvial activity, and local to regional structural influences have all affected the surface morphology.

Author

Craters; Geological Surveys; Planetary Geology; Structural Basins; Geomorphology; Planetary Mapping; Watersheds; Paleontology

20080041006 Geological Survey, Flagstaff, AZ, USA

Geologic Mapping of Athabasca Valles

Keszthelyi, L. P.; Jaeger, W. L.; Tanaka, K.; Hare, T.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Two factors drive us to map the Athabasca Valles area in unusual detail: (1) the extremely well-preserved and exposed surface morphologies and (2) the extensive high resolution imaging. In particular, the near-complete CTX coverage of Athabasca Valles proper and the extensive coverage of its surroundings have been invaluable. The mapping has been done exclusively in ArcGIS, using individual CTX, THEMIS VIS, and MOC frames overlying the THEMIS IR daytime basemap. MOLA shot points and gridded DTMs are also included. It was found that CTX images processed through ISIS are almost always within 300 m of the MOLA derived locations, and usually within tens of meters, with no adjustments to camera pointing. THEMIS VIS images appear to be systematically shifted to the southwest of their correct positions and MOC images are often kilometers off. The good SNR and minimal artifacts make the CTX images vastly more useful than the THEMIS VIS or MOC images. The bulk of the mapping was done at 1:50,000 scale on CTX images. In more complex areas, mapping at 1:24,000 proved necessary. The CTX images were usually simultaneously viewed on a second monitor using the ISIS3 qview program to display the full dynamic range of the CTX data. Where CTX data was not available, mapping was often done at 1:100,000 and most contacts are mapped as approximate.

Derived from text

Geological Surveys; Planetary Mapping; Imaging Techniques; Dynamic Range; High Resolution; Cameras

20080041007 Academy of Sciences (Russia), Moscow, Russian Federation

Formation and Evolution of Lakshmi Planum (V-7), Venus: Assessment of Models using Observations from Geological Mapping

Ivanov, M. A.; Head, James W.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Copyright; Avail.: CASI: A01, Hardcopy

Lakshmi Planum is a high-standing plateau (3.5-4.5 km above MPR) surrounded by the highest mountain ranges on Venus. Lakshmi represents a unique type of elevated region different from dome-shaped and rifted rises and tessera-bearing crustal plateaus. The unique characteristics of Lakshmi suggest that it formed by an unusual combination of processes and played an important role in Venus geologic history. Lakshmi was studied with Venera-15/16 and Magellan data, resulting in two classes of models, divergent and convergent, to explain its unusual topographic and morphologic characteristics. Divergent models explain Lakshmi as a site of mantle upwelling due to rising and subsequent collapse of a mantle diapir; such models explain emplacement of a lava plateau inside Lakshmi and, in some circumstances, formation of the mountain ranges. The convergent models consider Lakshmi as a locus of mantle downwelling, convergence, underthrusting, and possible subduction. Key features in these models are the mountain ranges, high topography of Lakshmi interior, and the large volcanic centers in the plateau center. These divergent and convergent models entail principally different mechanisms of formation and suggest different geodynamic regimes on Venus. Almost all models make either explicit or implicit predictions about the type and sequence of major events during formation and evolution of Lakshmi and thus detailed geological mapping can be used to test them. Here we present the results of such geological mapping (the V-7 quadrangle, 50-75degN, 300-360degE; scale 1:5M) that allows testing the proposed models for Lakshmi.

Derived from text

Plateaus; Venus Surface; Paleontology; Volcanoes; Geodynamics; Subduction (Geology); Thematic Mapping; Venera Satellites

20080041008 Brown Univ., Providence, RI, USA

Geological Mapping of the North Polar Region of Venus (V-1 Snegurochka Planitia): Significant Problems and Comparisons to the Earth's Archean

Head, James W.; Hurwitz, D. M.; Ivanov, M. A.; Basilevsky, A. T.; Kumar, P. Senthil; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The geological features, structures, thermal conditions, interpreted processes, and outstanding questions related to both the Earth's Archean and Venus share many similarities and we are using a problem-oriented approach to Venus mapping, guided by perspectives from the Archean record of the Earth, to gain new insight into both. The Earth's preserved and well-documented Archean record provides important insight into high heat-flux tectonic and magmatic environments and structures and Venus reveals the current configuration and recent geological record of analogous high-temperature environments unmodified by subsequent several billion years of segmentation and overprinting, as on Earth. We have problems on which progress might be made through comparison. Here we present the major goals of the geological mapping of the V-1 Snegurochka Planitia Quadrangle, and themes that could provide important insights into both planets:

Derived from text

Heat Flux; Venus Surface; Thematic Mapping; Precambrian Period; Tectonics; Geology

20080041009 Academy of Sciences (Russia), Moscow, Russian Federation

Geologic Map of the Meskhent Tessera Quadrangle (V-3), Venus: Evidence for Early Formation and Preservation of Regional Topography

Ivanov, M. A.; Head, James W.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The area of the Meskhent Tessera quadrangle (V-3, 50-75degN, 60-120degE, Fig. 1) corresponds to a transition zone from the uplands of Ishtar Terra to the west to the lowlands of Atalanta Planitia to the east. The topographic configuration, gravity signature, and presence of large tesserae in Ishtar Terra are consistent with extensive areas of thickened crust and tectonically stabilized lithosphere representing ancient and now extinct regimes of mantle convection. The gravity and topographic characteristics of Atalanta Planitia have been cited as evidence for large-scale mantle downwelling. Thus, the region of Meskhent Tessera quadrangle represents an important sample for the study of the regional history of long-wavelength

topography (highlands, midlands, and lowlands), interaction between the downwelling and areas of thickened crust/lithosphere, formation of associated tectonic features, and emplacement of volcanic plains.
Derived from text
Venus Surface; Tectonics; Highlands; Lithosphere; Volcanoes; Convection; Gravitation

20080041011 Geological Survey, Flagstaff, AZ, USA
Recent Geologic Mapping Results for the Polar Regions of Mars
tanaka, K. L.; Kolb, E. J.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 3 pp.; In English; See also 20080040988; Copyright; Avail.: CASI: A01, Hardcopy

The polar regions of Mars include the densest data coverage for the planet because of the polar orbits of MGS, ODY, and MEX. Because the geology of the polar plateaus has been among the most dynamic on the planet in recent geologic time, the data enable the most detailed and complex geologic investigations of any regions on Mars, superseding previous, even recent, mapping efforts [e.g., 1-3]. Geologic mapping at regional and local scales is revealing that the stratigraphy and modificational histories of polar materials by various processes are highly complex at both poles. Here, we describe some of our recent results in polar geologic mapping and how they address the geologic processes involved and implications for polar climate history.
Author
Mars Surface; Geological Surveys; Planetary Mapping; Stratigraphy; Polar Regions; Polar Orbits; Plateaus; Geochronology

20080041012 Geological Survey, Flagstaff, AZ, USA
Mars Global Geologic Mapping: Amazonian Results
Tanaka, K. L.; Dohm, J. M.; Irwin, R.; Kolb, E. J.; Skinner, J. A., Jr.; Hare, T. M.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

We are in the second year of a five-year effort to map the geology of Mars using mainly Mars Global Surveyor, Mars Express, and Mars Odyssey imaging and altimetry datasets. Previously, we have reported on details of project management, mapping datasets (local and regional), initial and anticipated mapping approaches, and tactics of map unit delineation and description [1-2]. For example, we have seen how the multiple types and huge quantity of image data as well as more accurate and detailed altimetry data now available allow for broader and deeper geologic perspectives, based largely on improved landform perception, characterization, and analysis. Here, we describe early mapping results, which include updating of previous northern plains mapping [3], including delineation of mainly Amazonian units and regional fault mapping, as well as other advances.
Derived from text
Mars Surface; Planetary Mapping; Planetary Geology; Landforms; Imaging Techniques; Mars Express; Mars Global Surveyor

20080041013 Massachusetts Univ., Amherst, MA, USA
Geology of the Lachesis Tessera Quadrangle (V-18), Venus
McGill, George E.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Copyright; Avail.: CASI: A01, Hardcopy

The Lachesis Tessera Quadrangle (V-18) lies between 25deg and 50deg north, 300deg and 330deg east. Most of the quadrangle consists of 'regional plains' (1) of Sedna and Guinevere Planitiae. A first draft of the geology has been completed, and the tentative number of mapped units by terrain type is: Tesserae - 2; plains - 4; ridge belts - 1; fracture belts - 1 (plus embayed fragments of possible additional belts); coronae - 3; central volcanoes - 1; shield flows - 2; paterae - 1; impact craters - 1; undifferentiated flows - 1; bright materials - 1. By far the areally most extensive materials are regional plains. These are mapped as two units, based on radar backscatter ('radar brightness'). The brighter unit appears to be younger than the darker unit. This inference is based on the common presence within the lighter unit of circular or nearly circular inliers of material with radar backscatter characteristic of the darker unit. The circular inliers are most likely low shield volcanoes, which are commonly present on the darker unit, that were only partially covered by the brighter unit. Clear cut examples of wrinkle ridges and fractures superposed on the darker unit but truncated by the brighter unit have not been found to date. These relationships indicate that the brighter unit is superposed on the darker unit, but that the difference in age between them is very small. Because they are so widespread, the regional plains are a convenient relative age time 'marker.' The number of impact craters superposed on these plains is too small to measure age differences (2), and thus we cannot estimate how much time elapsed between the emplacement of the darker and brighter regional plains units. More local plains units are defined by

significantly lower radar backscatter or by a texture that is mottled at scores to hundreds of kilometers scale. A plains-like unit with a homogenous, bright diffuse backscatter is present as scattered exposures in the eastern part of the quadrangle. These exposures have been mapped as 'bright material,' but it is not clear at present if this is a valid unit or if it is part of the brighter regional plains unit. Tessera terrain is primarily found along the western border of the quadrangle, where Lachesis Tessera refers to the southern exposures, and Zirka Tessera refers to northern exposures. A second tessera unit has been mapped with the symbol 't?.' This unit appears to be deformed by the requisite 2 sets of closely spaced structures, but it is so extensively flooded by regional plains materials that the structural fabric is partially obscured. Tessera terrain is present in the adjacent V-17 quadrangle, where both Lachesis Tessera and Zirka Tessera are areally more extensive than in V-18. Ridge and fracture belts are both present, but not as extensive as is the case in, for example, the Pandrosos Dorsa (3) and Lavinia Planitia (4) quadrangles. As is commonly the case, it is difficult to determine if the materials of these belts are older or younger than regional plains. A recent study using radar properties (5) demonstrated that at least most ridge belts appear to be older than regional plains. The materials of fracture belts probably are also older than regional plains, but the fractures themselves can be both older and younger than regional plains (e.g., 3).
Derived from text
Geology; Venus Surface; Brightness; Terrain; Coronas

20080041016 Arizona State Univ., Tempe, AZ, USA
Geologic Mapping of the Zal, Hi'iaka, and Shamshu Regions of Io
Bunte, Melissa K.; Williams, D. A.; Greeley, R.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Copyright; Avail.: CASI: A01, Hardcopy

We have produced regional geologic maps of the Zal, Hi'iaka, and Shamshu regions of Io s antijovian hemisphere based on Galileo mission data. Here we discuss the geologic features, summarize the map units and structures that are present, discuss the nature of volcanic activity, and give an analysis of the volcanic, tectonic, and gradational processes that affect the regions in order to better understand Io s geologic evolution. Zal Region: The Zal region (25-45degN, 65-85degW) consists of Zal Patera (120 km wide x 197 km long), two major mountains (north and south Zal Montes) which border Zal Patera to the west and south [1], and an unnamed patera ('Patera A') west of south Zal Montes. The Zal region includes at least two hotspots detected by Galileo: one along the western scarp of the Zal Patera volcano and one at the 'Patera A' volcano. The floor of Zal Patera has been partly resurfaced by dark lava flows since Voyager imaging; portions of the patera floor appear unchanged during the Galileo mission. Mountains exhibit stages of degradation. The western bounding scarp of Zal Patera appears to be a fissure source vent for multiple silicate lava flows. The Zal Montes and Patera complex appears to be an example of volcano-tectonic interactions [1, 2]. Several of the flow units emanate from the fissure at the western scarp [2]. Hi'iaka Region: The Hi'iaka region (approx.12degS-5degN, 75-87degW) consists of Hi'iaka Patera, a large (60 km wide x 95 km long) patera, north and south Hi iaka Montes which border Hi'iaka Patera to the west and south and are L-shaped mirror-images of each other, west Hi'iaka Montes, a small isolated peak, and an unnamed patera ('Patera B') located south of north Hi'iaka Montes. The region includes one hotspot at Hi'iaka Patera. The floor of the patera exhibits flow deposits of differing ages. The eastern scarp of Hi'iaka Patera may be a fissure source vent for the patera floor materials. The Hi iaka Montes and Patera complex appears to be an example of volcano-tectonic interactions [1, 2]. Shamshu Region: The Shamshu region (approx.15degS-5degS, 55-77degW) consists of Shamshu Patera, three mountain units (west, north, and south Shamshu Mons), and a small unnamed patera ('Patera C') southwest of Shamshu Mons.
Derived from text
Geological Surveys; Planetary Mapping; Structural Properties (Geology); Tectonics; Fissures (Geology); Imaging Techniques; Volcanoes; Io

20080041017 Academy of Sciences (Russia), Moscow, Russian Federation
Structural Maps of the V-17 Beta Regio Quadrangle, Venus
Basilevsky, A. t.; Head, James W.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

These represent slices of the geologic map into 7 time-stratigraphic levels whose descriptions are found in [3-6]. From older to younger they are: 1) Tessera material unit (t), 2) Densely fractured plains material unit (PDF), 3) Fractured and ridged plains material unit (pfr), 4) Tessera transitional terrain structural unit (tt), 5) Fracture belts structural unit (fb), 6) Shield plains (psh) and plains with wrinkle ridges (pwr) material units combined, and 7) Lobate (pl) and smooth (ps) plains material units combined and, approximately contemporaneous with them, the structural unit of rifted terrain (rt). Each slice shows the generalized pattern of structures typical of these units. Figures 1-7 show the seven maps and Figure 8 shows the combined map illustrating what is shown in the seven maps. To visualize the Beta Regio uplift outlines, the major structure of this area,

we show the +0.5 km and +2.5 km contour lines, corresponding respectively to the base and the mid-height of the uplift. It is seen in Figures 1-2 and 4 the trends of t, PDF and tt occupy relatively small areas and their structures seen in these small windows appear rather variable and with almost no orientation heritage with time. Figure 3 shows that swarms of ridge belts trend mostly NW and go through the Beta structure with no alignment with it, suggesting that this structure did not yet exist at this time. Figure 5 shows that fracture belts align along the northern base of the Beta uplift suggesting onset of the formation of this structure. Figure 6 shows that wrinkle ridges do not show alignment with the Beta uplift suggesting that this already forming structure was not high enough to exert topographic stress in its vicinity. Figure 7 shows that the Beta uplift has Devana Chasma as an axial rift zone, suggesting a genetic link between the uplift and rifting. Figure 8 shows that structural trends in this area significantly changed with time.
Derived from text
Geological Faults; Planetary Mapping; Stratigraphy; Venus Surface; Topography; Alignment

20080041018 Perugia Univ., Perugia, Italy
Merging of the USGS Atlas of Mercury 1:5,000,000 Geologic Series
Frigeri, A.; Federico, C.; Pauselli, C.; Coradini, A.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

After 30 years, the planet Mercury is going to give us new information. The NASA MESSENGER [1] already made its first successful flyby on December 2007 while the European Space Agency and the Japanese Space Agency ISAS/JAXA are preparing the upcoming mission BepiColombo [2]. In order to contribute to current and future analyses on the geology of Mercury, we have started to work on the production of a single digital geologic map of Mercury derived from the merging process of the geologic maps of the Atlas of Mercury, produced by the USA Geological Survey, based on Mariner 10 data. The aim of this work is to merge the nine maps so that the final product reflects as much as possible the original work. Herein we describe the data we used, the working environment and the steps made for producing the final map.
Derived from text
Mercury Surface; Planetary Mapping; Mariner 10 Space Probe; Geological Surveys; Mercury (Planet); Digital Data

20080041019 Colorado Univ., Boulder, CO, USA
Geologic Mapping of the Meridiani Region, Mars
Hynek, B. M.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The light toned bedrock that has been observed at the Mars Exploration Rover Opportunity landing site is an upper layer in a sequence >600 m thick in places. These outcrops contain mineral and textural signatures that require interaction of, and possibly formation from, water. Many distinct layers are visible in the remote sensing data (e.g. Figure 1) and no work has ever characterized the full set of these materials that cover an area >3 105 km2 spanning 20 of longitude. Thus, whatever water-related process(es?) altered, and possibly formed, the rocks at the Opportunity landing site extended over a vast region of Mars. Yet many questions remain to be answered, such as: (1) in what capacity did water form and alter the deposits?, (2) what are the temporal and spatial relations with other major events known from ancient Mars?, and (3) would this type of environment have been conducive to the development of life? To address these questions we are completing a detailed geologic, stratigraphic, and thermophysical properties study of this widespread terrain. Specifically, we are drafting a 1:2M-scale geological map covering the full extent of these water-related deposits. In tandem with the mapping, Hynek and Phillips [1] have conducted a preliminary stratigraphic analysis of the stack of materials. After mapping is complete, we will study the thermophysical properties of the varied layers to derive possible compositional information of the materials. These tasks serve several purposes including gaining an understanding of the complex nature of these materials, their potential source region(s), and their timing of emplacement. All of these efforts are necessary to place the observations by the Opportunity Rover in a broader context and prepare for potential future landed missions to the region. Understanding the large-scale paleohydrology of Mars is central to NASA s goals and vital for determining if life ever arose on the planet.
Derived from text
Thermophysical Properties; Planetary Mapping; Geological Surveys; Mars Exploration; Mars Surface; NASA Programs; Remote Sensing; Stratigraphy; Terrain

20080041021 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Renewed Mapping of the Nepthys Mons Quadrangle (V-54), Venus

Bridges, Nathan T.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

After a long hiatus due to competing tasks with the PI, mapping of Venus' Nepthys Mons Quadrangle (V-54, 300-330degE, 25-50degS) has been resumed, with planned submission late in 2008 or early 2009. Major goals are to determine the style of volcanism and tectonism over time, the evolution of shield volcanoes, the evolution of coronae, the characteristics of plains volcanism, and what these observations tell us about the general geologic history of Venus. This abstract largely repeats earlier progress reports, with some updates to show GEMS that the PI intends to complete this task in the near future. Methods: Geologic units and structures have been mapped onto hardcopy FMAPs and then transferred to the 1:5 million-scale map base (Figure 1). Pseudostereo anaglyphs have proved an indispensable tool and have resulted in a virtual complete revision of previously mapped areas [1,2]. At FMAP scale, structural trends and inferred ages are broken out using different symbols and colors. These are in the process of being transferred to a 1:5 million-scale structure map separate from the geologic map. The geologic units, structures, impact craters, coronae, and volcanoes are being arranged in time-stratigraphic sequences as the mapping progresses.

Derived from text

Planetary Mapping; Structural Properties (Geology); Venus Surface; Paleontology; Stratigraphy; Sequencing

20080041022 Geological Survey, Flagstaff, AZ, USA

Lunar Geologic Mapping Program: 2008 Update

Gaddis, L.; Tanaka, K.; Skinner, J.; Hawke, B. R.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The NASA Lunar Geologic Mapping Program is underway and a mappers handbook is in preparation. This program for systematic, global lunar geologic mapping at 1:2.5M scale incorporates digital, multi-scale data from a wide variety of sources. Many of these datasets have been tied to the new Unified Lunar Control Network 2005 [1] and are available online. This presentation summarizes the current status of this mapping program, the datasets now available, and how they might be used for mapping on the Moon.

Derived from text

Lunar Surface; Lunar Maps; Geological Surveys; Digital Data

20080041023 National Geophysical Research Inst., Hyderabad, India

Geological Mapping of the Lada Terra (V-56) Quadrangle, Venus: A Progress Report

Kumar, P. Senthil; Head, James W., III; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Geological mapping of the V-56 quadrangle (Fig. 1) reveals various tectonic and volcanic features and processes in Lada Terra that consist of tesserae, regional extensional belts, coronae, volcanic plains and impact craters. This study aims to map the spatial distribution of different material units, deformational features or lineament patterns and impact crater materials. In addition, we also establish the relative age relationships (e.g., overlapping or cross-cutting relationships) between them, in order to reconstruct the geologic history. Basically, this quadrangle addresses how coronae evolved in association with regional extensional belts, in addition to evolution of tesserae, regional plains and impact craters, which are also significant geological units of Lada Terra.

Derived from text

Thematic Mapping; Venus Surface; Paleontology; Spatial Distribution; Tectonics; Topography; Geology

20080041024 Brown Univ., Providence, RI, USA

Geologic Map of the V-1 Snegurochka Planitia Quadrangle: Progress Report

Hurwitz, Debra M.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Geologic mapping of Snegurochka Planitia (V-1) reveals a complex stratigraphy of tectonic and volcanic features that can provide insight into the geologic history of Venus and Archean Earth [1,2] including 1) crustal thickening environments and

processes, 2) the nature of diapirism, 3) the nature and origin of deformation belts, and 4) the origin and context of regional plains-forming volcanism. This abstract presents our progress in mapping the spatial and stratigraphic relationships of these features in the region surrounding the north pole of Venus.
Derived from text
Venus (Planet); Geological Surveys; Thematic Mapping; Volcanology; Spatial Distribution; Stratigraphy; Tectonics

20080041025 Academy of Sciences (Russia), Moscow, Russian Federation
The Fredegonde (V-57) Quadrangle, Venus: Characterization of the Venus Midlands
Ivanov, M. A.; Head, James W.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The Fredegonde quadrangle (V-57, 50-75degS, 60-120degE) in the southern hemisphere of Venus represents a typical region of midlands (0-2 km above MPR). Midlands are the most widespread topographic province on Venus (approx.80%) and display the richest variety of features. Geological mapping in the V-57 quadrangle provides the possibility of defining and characterizing units that make up a region of midlands and to establish the general sequence of events there and thus address questions about the modes of formation and chronology of midlands on Venus. The map area is in contact with the uplands in the central portion of Lada Terra to the west and the lowlands of Aino Planitia to the northeast. This position also provides a transitional zone between the other two major topographic provinces, similar to that of the Meskhent Tessera (V-3) area. Here we report on the results of our mapping in the V-57 quadrangle, describe the major features, units, and structural assemblages exposed there, and outline the main episodes of geologic history.
Derived from text
Radioactive Isotopes; Vanadium Isotopes; Venus Surface; Chronology; Paleontology; Thematic Mapping

20080041101 Monterey Bay Aquarium Research Inst., Moss Landing, CA USA
Modeling the Central California Coastal Upwelling System: Physics, Ecosystems and Resource Management
Chavez, Francisco P; Barber, Richard T; Chai, Fei; Chao, Yi; De Vogelaere, Andrew P; Kindle, John C; Maffione, Robert A; Marinovic, Baldo; McWilliams, James C; Paduan, Jeffrey D; Jan 2003; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483238; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483238

To develop a coupled physical-biological model that can utilize available data to accurately simulate physical, chemical and biological processes within the Monterey Bay National Marine Sanctuary (MBNMS). To use the model to better understand the central California coastal upwelling ecosystem. To develop better methods for management and protection of the California coast ecosystem as a valuable natural resource. To better understand the physical and biogeochemical dynamics of the California coastal upwelling system and how it responds to changes in local and large-scale atmospheric forcing, and global change.
DTIC
Coasts; Ecosystems; Models; Resources Management; Upwelling Water

20080041138 Naval Observatory, Washington, DC USA
Statistics of the MASIV 5 GHZ VLA Scintillation Survey
Jauncey, David; Lovell, James; Rickett, Barney; Macquart, Jean-Pierre; Bignall, Hayley; Ojha, Roopesh; Kedziora-Chudczer, Lucyna; Pursimo, Tapio; Senkbeil, Cliff; Shabala, Stanislav; Oct 2007; 6 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483314; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483314

We are undertaking a large-scale VLA 5 GHz variability survey of the northern sky searching for rapid intra-day variability. From four epochs of observations spread over a year we find 56% of the flat-spectrum sources showed significant variability on time-scales from hours to days, with many sources varying episodically on only one epoch during the year. We find that the weaker sources show more frequent variability as well as fractionally larger amplitude variability. Fewer sources were detected at high Galactic latitude, demonstrating that inter-stellar scintillation is the principal mechanism responsible for this IDV. We also see a significant dependence on spectral index with the flatter and more inverted sources more frequently exhibiting scintillation.
DTIC
Scintillation; Statistics; Surveys; Variability; Very Large Array (VLA)

20080041228 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany

25 Jahre - Institut fuer Geodaesie, Teil 1: Wissenschaftliche Beitraege und Berichte (25 Years - Institute of Geodesy, Part 1: Scientific Contributions and Reports)

Caspary, Wilhelm; Heister, Hans; Schoedlbauer, Albert; Welsch, Walter; Jan 2000; 330 pp.; In German

Report No.(s): AD-A483390; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This volume is a collection of scientific articles and reports from contributors to the Institute of Geodesy over the last 25 years. The contributions in this volume focus on the following topics: Observation of time-dependent deformations of objects through continuous measurement; Geodetic astronomy - Prospects at the threshold of the 21st century; Geodesic analysis of dynamic processes; Testing of geodesic instruments; Computer program to better understand geographical aspects of meridian arc length and ellipsoid rotations; Kinematic Survey System (KISS); Kalman filter for kinematic positioning using GPS data; Course on measurement for civil and structural engineering at the Advanced Technical College at Regensburg; Simple and fast test for GPS antenna calibration; Kinematic Survey System (KISS); Computer-aided cartography; Optimal data processing; Geographical information systems; Photogrammetry analysis for image sequencing; Nonlinear analysis of time series in chaotic and haphazard systems; Geodetic monitoring of bridges; Electronic data transmission traffic; Multimedia software products for leisure activities in the Alps; Geodata transaction processing; Elliptic stop motions; Lokale geoidbestimmung im inntal-netz; Global gravity field models; and Kinematic modeling.

DTIC

Geodesy; Geographic Information Systems; Global Positioning System; Kinematics

20080041229 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany

25 Jahre - Institut fuer Geodaesie, Teil 2: Forschungsarbeiten und Veroeffentlichungen (25 Years - Institute of Geodesy, Part 2: Research Areas and Publications)

Caspary, Wilhelm; Heister, Hans; Schoedlbauer, Albert; Welsch, Walter; Jan 2000; 117 pp.; In German

Report No.(s): AD-A483391; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This volume reports on the main research activities of the Institute of Geodesy, presents a complete overview of all of its publications, and lists seminars and workshops that the Institute has sponsored.

DTIC

Geodesy; Geographic Information Systems; Global Positioning System; Kinematics

20080041230 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany

25 Jahre - Institut fuer Geodaesie, Teil 3: Aus dem Leben des Instituts (25 Years - Institute of Geodesy, Part 3: The Life of the Institute)

Caspary, Wilhelm; Heister, Hans; Schoedlbauer, Albert; Welsch, Walter; Jan 2000; 152 pp.; In German

Report No.(s): AD-A483392; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This volume reports on the community life of the Institute of Geodesy. The volume includes biographies of prominent professors, profiles of other Institute professors, synopses of projects and lectures that have taken place worldwide, and synopses of team projects.

DTIC

Geodesy; Geographic Information Systems; Global Positioning System; Kinematics

20080041294 Library of Congress, Washington, DC USA

Earthquakes: Risk, Monitoring, Notification, and Research

Folger, Peter; Jun 19, 2008; 25 pp.; In English

Report No.(s): AD-A483581; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Close to 75 million people in 39 states face some risk from earthquakes. Seismic hazards are greatest in the western USA, particularly California, Alaska, Washington, Oregon, and Hawaii. The Rocky Mountain region, a portion of the central USA known as the New Madrid Seismic Zone, and portions of the eastern seaboard, particularly South Carolina, also have a relatively high earthquake hazard. Compared to the loss of life in other countries, relatively few Americans have died as a result of earthquakes over the past 100 years. The USA, however, faces the possibility of large economic losses from earthquakedamaged buildings and infrastructure.

DTIC

Earthquakes; Risk

20080041554 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Spatial and Temporal Inter-Relationships between Anomalies and Trends of Temperature, Moisture, Cloud Cover, and OLR as Observed by AIRS/AMSU on Aqua

Susskind, Joel; [2008]; 1 pp.; In English; AGU Meeting, 15-19 Dec. 2008, San Francisco, CA, USA; No Copyright; Avail.: Other Sources; Abstract Only

AIRS/AMSU is the advanced IR/MW atmospheric sounding system launched on EOS Aqua in May 2002. Products derived from AIRS/AMSU by the AIRS Science Team include surface skin temperature and atmospheric temperature profiles; atmospheric humidity profiles, fractional cloud cover and cloud top pressure, and OLR. Products covering the period September 2002 through the present have been derived from AIRS/AMSU using the AIRS Science Team Version 5 retrieval algorithm. In this paper, we will show results covering the time period September 2006 - November 2008. This time period is marked by a substantial warming trend of Northern Hemisphere Extratropical land surface skin temperatures, as well as pronounced El Nino - La Nina episodes. These both influence the spatial and temporal anomaly patterns of atmospheric temperature and moisture profiles, as well as of cloud cover and Clear sky and All Sky OLR. The relationships between temporal and spatial anomalies of these parameters over this time period, as determined from AIRS/AMSU observations, will be shown, with particular emphasis on which contribute significantly to OLR anomalies in each of the tropics and extra-tropics. Results will also be shown to validate the anomalies and trends of temperature profiles and OLR as determined from analysis of AIRS/AMSU data. Global and regional trends during the 6 1/3 year period are not necessarily indicative of what has happened in the past, or what may happen in the future. Nevertheless, the inter-relationships of spatial and temporal anomalies of atmospheric geophysical parameters with those of surface skin temperature are indicative of climate processes, and can be used to test the performance of climate models when driven by changes in surface temperatures.

Author

Atmospheric Sounding; Cloud Cover; Atmospheric Temperature; Atmospheric Moisture; Temporal Distribution; Spatial Distribution; Aqua Spacecraft; Earth Observing System (EOS); Geophysics

20080041719 Alaska Univ., Fairbanks, AK USA

The Spatial and Temporal Variations in High Latitude Cosmic Noise Absorption and Their Relation to Luminous Aurora

Ansari, Z A; Parthasarathy, R; Leinbach, H; May 1963; 236 pp.; In English

Contract(s)/Grant(s): G14133; GP947

Report No.(s): AD-A484068; UAG-R138; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA484068

The spatial and temporal variations in cosmic radio noise absorption were investigated at College, Alaska, during 1962-1963 by means of riometers using one narrow beam antenna and two relatively broad beam antennas which were pointed at different directions along the magnetic meridian. The narrow beam antenna had a 12 deg beamwidth and was periodically swung in the magnetic meridian from 12 deg north of zenith to 12 deg south of zenith. Each of the broad beam antennas had a 26 deg beamwidth and was directed to 40 deg from zenith, one to the south and the other to the north. In order to explore the relation of the spatial variations in absorption with the differences in auroral luminosity existing in different directions at a given time, two lambda 5577A photometers were operated in the two switching directions of the narrow beam antenna i.e. 12 deg N and 12 deg S. The information about the auroral coverage of the various antenna beams was obtained from all-sky photographs. A simultaneous study of radio-wave absorption in relation to luminous aurora resulted in the conclusion that the nighttime radio-wave absorption observed at College, Alaska falls into the following two main categories. The absorption belonging to Category I is observed at any time between 2000-0200 hrs, correlates well with the intensity fluctuations of lambda 5577A, and is limited to luminous regions of the sky only. Included in the above category is the absorption associated with the quiet as well as bright and active phases of the display.

DTIC

Absorptivity; Acoustic Attenuation; Auroras; Cosmic Noise; Electromagnetic Noise; Luminosity; Polar Regions; Spatial Distribution; Temporal Distribution

20080042382 NASA Johnson Space Center, Houston, TX, USA

Iron Mineralogy and Aqueous Alteration from Husband Hlll through Home Plate at Gusev Crater, Mars: Results from the Moessbauer Instrument on the Spirit Mars Exploration Rover

Morries, R.V.; Schroder, C.; Ming, D.W.; Klingelhofer, G.; Fleischer, I.; Rodionov, D.S.; Yen, A.S.; Gellert, R.; Arvidson, R.E.; Crumpler, L.S.; Clark, B.C.; Cohen, B.A.; McCoy, T.J.; de Souza Jr., P.A.; Schmidt, M.E.; To published in Journal of Geophysical Research-Planets; September 23, 2008; 126 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): 50QM99022; Copyright; Avail.: Other Sources

Spirit's Moessbauer (MB) instrument determined the Fe mineralogy and oxidation state of 71 rocks and 43 soils during its exploration of the Gusev Plains and the Columbia Hills (West Spur, Husband Hill, Haskin Ridge, Northern Inner Basin, and Home Plate) on Mars. The plains are predominantly float rocks and soil derived from olivine basalts. Outcrops at West Spur and on Husband Hill have experienced pervasive aqueous alteration as indicated by the presence of goethite. Olivine-rich outcrops in a possible mafic/ultramafic horizon are present on Haskin Ridge. Relatively unaltered basalt and olivine basalt float rocks occur at isolated locations throughout the Columbia Hills. Basalt and olivine basalt outcrops are found at and near Home Plate, a putative hydrovolcanic structure. At least three pyroxene compositions are indicated by MB data. MB spectra of outcrops Barnhill and Torquas resemble palagonitic material and thus possible supergene aqueous alteration. Deposits of Fe(3+)-sulfate soil, located at Paso Robles, Arad, and Tyrone, are likely products of acid-sulfate fumarolic and/or hydrothermal activity, possibly in connection with Home Plate volcanism. Hematite-rich outcrops between Home Plate and Tyrone (e.g., Montalva) may also be products of this aqueous activity. Low water-to-rock 41 ratios (isochemical alteration) are implied during palagonite, goethite, and hematite formation because bulk chemical compositions are basaltic (SO3-free basis). High water-to-rock ratios (leaching) under acid-sulfate conditions are implied for the high-SiO2 rock and soil in Eastern Valley and the float rock FuzzySmith, which has possible pyrite/marcasite as a hydrothermal alteration product.

Author

Mineralogy; Mossbauer Effect; Iron Oxides; Hematite; Volcanology; Rocks; Basalt; Olivine

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METEOROLOGY AND CLIMATOLOGY

Includes weather observation forecasting and modification.

20080040816 Science Applications International Corp., Raleigh, NC USA

Weather-Normalized Ozone Trends in Baltimore and Washington, DC

Estomin, S.; Lee, M.; Jul. 30, 2007; 82 pp.; In English

Report No.(s): PB2008-100786; PPRP-143; No Copyright; Avail.: National Technical Information Service (NTIS)

Ozone production occurs mainly during the summer months and is influenced by a variety of meteorological parameters. To better interpret ozone trends in Maryland over time, the year-to-year fluctuations in summertime meteorology must be accounted for and adjusted. The goal of this analysis was to investigate how inter-annual 8-hour ozone levels are changing in Maryland. Fifteen years of daily ozone measurements (May through September) were subset into five daily meteorological clusters using an expectation-maximization technique based on available temperature, solar radiation, precipitation, and/or other meteorological parameters. The historical trends of each meteorological cluster were measured to determine which trends were statistically significant. By separately analyzing the trends of each meteorological cluster, the results have been weather-normalized to discount the effects of rainy or drought years in the analyses.

NTIS

Ozone; Trends; Weather; Meteorology; Climatology

20080040817 National Hurricane Center, Miami, FL, USA

Tropical Cyclone Report: Hurricane Lorenzo (AL132007), September 25-28, 2007

Franklin, J. L.; Oct. 18, 2007; 12 pp.; In English

Report No.(s): PB2008-104611; No Copyright; Avail.: CASI: A03, Hardcopy

Hurricane Lorenzo was a category 1 hurricane (on the Saffir-Simpson Hurricane Scale) that made landfall in Mexico south of Tuxpan - in virtually the same location that Hurricane Dean had struck a month earlier.

NTIS

Hurricanes; Storms; Tropical Storms

20080040836 National Hurricane Center, Miami, FL, USA
Tropical Cyclone Report: Hurricane Humberto (AL092007), September 12-14, 2007
Blake, E. S.; Nov. 28, 2007; 16 pp.; In English
Report No.(s): PB2008-104622; No Copyright; Avail.: National Technical Information Service (NTIS)
Humberto was a short-lived tropical cyclone that made landfall in extreme southeastern Texas as a strong category 1 hurricane (on the Saffir-Simpson Hurricane Scale). The hurricane is notable for its exceptionally rapid intensification near the coast of Texas from a tropical depression into a hurricane within 19 hours.
NTIS
Cyclones; Hurricanes; Storms; Tropical Storms

20080040837 National Hurricane Center, Miami, FL, USA
Tropical Cyclone Report: Tropical Depression Fifteen (AL152007), October 11-12, 2007
Beven, J.; Nov. 22, 2007; 2 pp.; In English
Report No.(s): PB2008-104613; No Copyright; Avail.: CASI: A01, Hardcopy
A large and complex area of disturbed weather extended from the northwestern Caribbean Sea into the western Atlantic beginning on 4 October. A surface low pressure system formed near the eastern end of the area on 8 October about 150 n mi northeast of the Turks and Caicos Islands. The associated convection gradually increased as the low moved east-northeastward, and by 1200 UTC 11 October there was sufficient organized convection to designate the system as a tropical depression while it was centered about 645 n mi east-southeast of Bermuda.
NTIS
Cyclones; Storms; Tropical Regions; Tropical Storms

20080040838 National Hurricane Center, Miami, FL, USA
Tropical Cyclone Report: Tropical Storm Melissa (AL142007), September 28-30, 2007
Knabb, R. D.; Oct. 13, 2007; 8 pp.; In English
Report No.(s): PB2008-104612; No Copyright; Avail.: CASI: A02, Hardcopy
Melissa was a short-lived tropical storm over the eastern Atlantic that formed near the Cape Verde Islands but did not affect land.
NTIS
Cyclones; Storms; Tropical Storms

20080040886 National Hurricane Center, Miami, FL, USA
Tropical Cyclone Report: Hurricane Karen (AL122007), September 25-29, 2007
Pasch, R. J.; Nov. 27, 2007; 11 pp.; In English
Report No.(s): PB2008-104610; No Copyright; Avail.: CASI: A03, Hardcopy
Karen was briefly a hurricane over the tropical Atlantic. It did not threaten land, and it dissipated just to the east of the Leeward Islands.
NTIS
Cyclones; Hurricanes; Storms; Tropical Storms

20080040887 National Hurricane Center, Miami, FL, USA
Tropical Cyclone Report: Tropical Storm Jerry (AL112007), September 23-24, 2007
Avila, L. A.; Oct. 24, 2007; 6 pp.; In English
Report No.(s): PB2008-104609; No Copyright; Avail.: CASI: A02, Hardcopy
Jerry was a short-lived tropical cyclone over the far northeastern Atlantic. A non-tropical low formed in the central North Atlantic on 21 September and meandered for a few days, while gradually developing deep convection. The thunderstorm activity became better organized and eventually wrapped around the low. Since the system was still well-involved with an upperlevel low and the strongest winds were well removed from the center, it is estimated that the depression that formed at 0000 UTC 23 September was subtropical in nature.
NTIS
Cyclones; Storms; Tropical Storms

20080040888 National Hurricane Center, Miami, FL, USA
Tropical Cyclone Report: Tropical Depression Ten (AL102007), September 21-22, 2007
Rhome, J. R.; Oct. 15, 2007; 7 pp.; In English
Report No.(s): PB2008-104608; No Copyright; Avail.: CASI: A02, Hardcopy
Tropical Depression Ten was a short-lived cyclone that formed over the eastern Gulf of Mexico on 21 September and made landfall early on 22 September along the Florida panhandle.
NTIS
Cyclones; Storms; Tropical Regions; Tropical Storms

20080040889 National Hurricane Center, Miami, FL, USA
Tropical Cyclone Report: Tropical Storm Ingrid (AL082007), September 12-17, 2007
Mainelli, M.; Oct. 17, 2007; 9 pp.; In English
Report No.(s): PB2008-104607; No Copyright; Avail.: CASI: A02, Hardcopy
Ingrid was a tropical storm that formed over the central tropical Atlantic Ocean and dissipated as it approached the Leeward Islands.
NTIS
Cyclones; Storms; Tropical Storms

20080040890 National Hurricane Center, Miami, FL, USA
Tropical Cyclone Report: Tropical Storm Gabrielle (AL072007), September 8-11, 2007
Brown, D. P.; Oct. 29, 2007; 13 pp.; In English
Report No.(s): PB2008-104606; No Copyright; Avail.: CASI: A03, Hardcopy
Gabrielle was a tropical storm that made landfall along the Cape Lookout National Seashore in eastern North Carolina, and then exited the coast less than 12 hours later near Kill Devil Hills.
NTIS
Cyclones; Storms; Tropical Storms

20080040891 National Hurricane Center, Miami, FL, USA
Tropical Cyclone Report: Tropical Storm Chantal (AL032007), July 31-August 1, 2007
Pasch, R. J.; Oct. 18, 2007; 6 pp.; In English
Report No.(s): PB2008-104605; No Copyright; Avail.: CASI: A02, Hardcopy
Chantal was a short-lived tropical storm that moved roughly parallel to, but offshore from, the U.S. east coast.
NTIS
Cyclones; Storms; Tropical Storms

20080040928 National Oceanic and Atmospheric Administration, Rockville, MD USA
Rogers, Minnesota: Complex Weather Conditions, Radar Limitations Delayed NWS Warning of Deadly Tornado. Public Release
Mar. 2007; 30 pp.; In English
Report No.(s): PB2008-103629; No Copyright; Avail.: National Technical Information Service (NTIS)
On September 16, 2006, a few minutes before 10:00 p.m. local time, a tornado struck the city of Rogers, Minnesota, killing a 10-year-old girl, injuring six others, and damaging dozens of structures. Although the area was under both a tornado watch and severe thunderstorm warning at the time, the National Weather Service (NWS) did not issue a tornado warning before the tornado hit. NWS Chanhassen, Minnesota, weather forecast office (WFO) is responsible for issuing tornado and severe thunderstorm warnings for Hennepin County, which includes the city of Rogers. During the 12 minutes the tornado was on the ground, the Chanhassen office received no reports of tornado sightings from public safety officials or trained weather spotters. But the WFOs damage assessment performed the following day determined that a tornado rated F2 on the Fujita Scale had indeed hit the city. The assessment also determined that the tornado initially touched down about 3.5 miles west of Rogers, moved northeast through the northern part of the city, and dissipated in a neighboring county. The tornado left a path of damage 8 miles long. Based on the NWS damage assessment, the tornados winds were estimated to be less than 73 miles per

hour when it touched down, but it quickly gained strength. Wind speeds had reached an estimated 113-157 mph when it hit Rogers. The storms intensity diminished as it moved into adjacent Anoka County.
NTIS
Delay; Forecasting; Meteorological Radar; Meteorological Services; Tornadoes; Warning Systems

20080041083 National Center for Atmospheric Research, Boulder, CO USA
Investigating Characteristics of Air-Sea Interactions in the Wave and Surface Layers
Sun, Jielun; Jul 2, 2008; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-06-C-0125
Report No.(s): AD-A483185; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483185

We were funded to participate in the Coupled Boundary Layers/Air-Sea Transfer under low wind (CBLAST-Low) pilot experiment in 2001 and main experiment in 2003 and analyze the data collected from both field campaigns. Our focuses are air-sea interactions under weak winds by analyzing simultaneous measurements of directional waves and atmospheric turbulence. We found that air-sea interactions strongly depend on whether the oceanic wave energy peak is dominated by swell or windsea especially under weak winds. Under weak winds and swell sea, the vertical variation of the momentum transfer is small. As swell dominates oceanic waves and travels in the same direction as wind, low-level jets are commonly observed. As swell dominates oceanic waves and travels in the opposite direction as wind, wind speed tends to increase slightly towards the sea surface and upward momentum flux transfer was observed over the region. As a result, the drag coefficient under weak winds is larger over swell than over wind sea, which explains the previously observed puzzle that the drag coefficient increases with decreasing wind speed under weak winds.
DTIC
Air Water Interactions; Surface Layers

20080041099 Naval Postgraduate School, Monterey, CA USA
Determination of Model Valid Prediction Period Using the Backward Fokker-Planck Equation
Chu, Peter C; Ivanov, Leonid M; Fan, C W; Jan 2002; 9 pp.; In English
Report No.(s): AD-A483219; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483219

How long is an ocean (or atmospheric) model valid once it has been integrated from its initial state? What is the model valid prediction period (VPP)? To answer these questions, uncertainty in ocean (or atmospheric) models should be investigated. It is widely recognized that this uncertainty can be traced back to three factors: measurement errors; model errors, such as discretization and uncertain model parameters; and chaotic dynamics. The measurement errors cause uncertainty in initial and/or boundary conditions. The discretization causes small-scale 'subgrid' processes to be either discarded or parameterized. The chaotic dynamics may trigger a subsequent amplification of small errors through a complex response. In this study, the authors develop a theoretical framework of model predictability evaluation using VPP, and they illustrate the usefulness and special features of VPP. Section 2 describes the prediction error of deterministic and stochastic models. Section 3 presents an estimate of VPP. Section 4 discusses the determination of VPP for a one-dimensional stochastic dynamical system. Section 5 presents the conclusions. In conclusion, the model VPP depends not only on the instantaneous error growth, but also on the noise level, the tolerance level, and the initial error. A theoretical framework was developed in this study to determine the mean and variability of model VPP for a nonlinear stochastic dynamical system. The joint probability density function of the valid prediction period and initial error satisfies the backward Fokker-Planck equation when the VPP is assumed homogeneous. After solving the backward Fokker-Planck equation, it is easy to obtain the ensemble mean and variance of the model VPP.
DTIC
Atmospheric Models; Errors; Fokker-Planck Equation; Ocean Models; Predictions

20080041133 Naval Research Lab., Stennis Space Center, MS USA
Visual Analysis of North Atlantic Hurricane Trends Using Parallel Coordinates and Statistical Techniques
Steed, Chad A; Fitzpatrick, Patrick J; Jankun-Kelly, T J; Swan II, J E; Jul 7, 2008; 21 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483298; NRL/MR/7440--08-9130; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483298

The integration of automated statistical analysis capabilities with a highly interactive, multivariate visualization interface

is presented in this paper. Innovative visual interaction techniques such as dynamic axis scaling, conjunctive parallel coordinates, statistical indicators, and aerial perspective shading are exploited to enhance the utility of classical parallel coordinate plots. Moreover, the system facilitates statistical processes such as stepwise regression and correlation analysis to assist in the identification and quantification of the most significant predictors for a particular dependent variable. These capabilities are combined into a unique visualization system that is demonstrated via a North Atlantic hurricane climate study using a systematic workflow. This research corroborates the notion that enhanced parallel coordinates coupled with statistical analysis can be used for more effective knowledge discovery and confirmation in complex, real-world data sets.
DTIC
Atlantic Ocean; Coordinates; Display Devices; Graphical User Interface; Hurricanes; Multivariate Statistical Analysis; Regression Analysis; Statistical Analysis; Trends

20080041135 Army Research Lab., White Sands Missile Range, NM USA
Portable Weather Intelligence for the Soldier
Sauter, David; Jul 2008; 24 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483306; ARL-TR-4502; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483306

Enhancements in computer hardware and software technology have allowed the development and porting of advanced environmental effects applications on highly portable lightweight computing devices. The U.S. Army Research Laboratory's (ARL) Battlefield Environment Division has developed a number of such products on a personal digital assistant (PDA) for use by individual Soldiers. This technology includes a mobile heat stress calculator, an Artillery meteorological messages application (fielded in fiscal year 2007 (FY07) on the multi-service Centaur PDA), a weather alert, a rules-based weather effects application, and others. Each is discussed in detail.
DTIC
Computers; Intelligence; Military Personnel; Weather

20080041267 Naval Postgraduate School, Monterey, CA USA
Climatic Variations in Tropical West African Rainfall and the Implications for Military Planners
Montgomery, Christi S; Jun 2008; 111 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483505; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We have identified statistical and dynamical relationships between summer rainfall variations in tropical West Africa (TWA) and El Nino/La Nina (ENLN) events in the tropical Pacific. Our primary data sets were the National Centers for Environmental Prediction / National Center for Atmospheric Research reanalysis fields and the Multivariate ENSO Index (MEI) for the period 1970-2007. Correlations of TWA rainfall and MEI time series showed that high (low) TWA rainfall was significantly correlated with LN (EN) events, with LN (EN) leading by zero to seven months. Composite analyses showed that ENLN impacts on TWA occurred via global scale equatorial Rossby-Kelvin waves and Southern Hemisphere Rossby wave trains that extended into the tropical African region. We also found regional connections between positive (negative) sea surface temperature (SST) anomalies in the Gulf of Guinea and Angola coastal waters and negative (positive) TWA rainfall anomalies. We expect our results to contribute to improved long lead rainfall predictions for TWA. This would allow military and civilian planners to construct a more effective framework for Theater Security Cooperation in TWA, including strategies for mitigating the impacts of climate variations and climate change.
DTIC
Africa; Climate; Climatology; Military Operations; Planning; Rain; Tropical Regions

20080041277 National Oceanic and Atmospheric Administration, Camp Springs, MD USA
Operational Utilization of High Resolution Ocean Surface Wind Vectors (25km or better) in the Marine Forecasting Environment
Chang, Paul S; Sienkiewicz, Joseph; Knabb, Richard; Gaiser, Peter W; Long, David G; Freeberg, Mark; Jan 2005; 22 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483532; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The work proposed here seeks to exploit currently and soon to be available satellite ocean surface vector wind data in the operational weather forecasting environment. This work will build upon an ongoing effort to quantify the impacts of QuikSCAT ocean vector wind data in the operational short-term warnings and forecasts issued by the NWS Ocean Prediction Center (OPC), and extends the effort to include the NWS Tropical Prediction Center and OCENS, Inc, a small company

specializing in ocean and weather monitoring tools and services for the commercial and recreational marine users. In addition to the standard 25km wind vector products from QuikSCAT, this effort will also investigate the impacts of higher spatial resolution wind vector products (12.5km and higher) and the wind vector retrieval capabilities of WindSAT, a polarimetric microwave radiometer.
DTIC
Forecasting; Ground Wind; High Resolution; Marine Environments; Meteorological Satellites; Ocean Surface; Wind Direction

20080041341 Massachusetts Inst. of Tech., Cambridge, MA USA
U.S. GODAE: Sustained Global Ocean State Estimation for Scientific and Practical Application
Wunsch, Carl; Fukumori, Ichiro; Lee, Tong; Menemenlis, Dimitris; Behringer, David W; Rienecker, Michele; Ponte, Rui; Jan 2004; 9 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-00-F-0038; N00014-01-F-0378
Report No.(s): AD-A483692; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The project's central technical goal is to establish, and to continually improve, a complete global ocean state estimation over the 21-plus-year period from 1985 to present, combining all available large-scale data sets with state-of-the-art general circulation models. Two particular interests define the initial foci: (1) Understanding of processes underlying the seasonal-to-interannual changes of ocean circulation and their use with the estimates and models to predict climate variability. (2) Decadal timescale climate change in the ocean, and its understanding for potential future prediction. Both foci involve developing the tools for generating dynamically and kinematically consistent estimates of the changing oceanic state, so as to include as much of the data, and dynamical understanding as is now available to the oceanographic community. Data from previous and ongoing large-scale ocean observation programs are being used, including WOCE and ARGO, and satellite missions (e.g., TOPEX/POSEIDON, Jason-1, QuikScat, etc.) and will both support and exploit experiments including the Climate Variability and Predictability Program (CLIVAR) and the Global Ocean Data Assimilation Experiment (GODAE).
DTIC
Climate Change; Climatology; Ocean Currents; Ocean Models; Oceans; State Estimation

20080041355 Columbia Univ., New York, NY USA
Enormous Disc of Cool Gas Surrounding the Nearby Powerful Radio Galaxy NGC 612 (PKS 0131-36)
Emonts, B H; Morganti, R; Oosterloo, T A; Holt, J; Tadhunter, C N; Hulst, van der, J M; Ojha, R; Sadler, E M; May 22, 2008; 15 pp.; In English
Report No.(s): AD-A483744; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We present the detection of an enormous disc of cool neutral hydrogen (HI) gas surrounding the SO galaxy NGC 612, which hosts one of the nearest powerful radio sources (PKS 0131-36). Using the Australia Telescope Compact Array, we detect M(HI) = 1.8 x 10(9) M(.) of HI emission-line gas that is distributed in a 140 kpc wide disc-like structure along the optical disc and dust-lane of NGC 612. The bulk of the gas in the disc appears to be settled in regular rotation with a total velocity range of 850 km s(-1), although asymmetries in this disc indicate that perturbations are being exerted on part of the gas, possibly by a number of nearby companions. The HI disc in NGC 612 suggests that the total mass enclosed by the system is M(enc) ~ 2.9 x 10(12) sin (-2i) M(.), implying that this early-type galaxy contains a massive dark matter halo. We also discuss an earlier study by Holt et al. that revealed the presence of a prominent young stellar population at various locations throughout the disc of NGC 612, indicating that this is a rare example of an extended ratio source that is hosted by a galaxy with a large-scale star-forming disc. In addition, we map a faint HI bridge along a distance of 400 kpc in between NGC 612 and gas-rich (M(HI) = 8.9 x 10(9) M(.)) barred galaxy NGC 619, indicating that likely an interaction between both systems occurred. From the unusual amounts of HI gas and young stars in this early-type galaxy, in combination with the detection of a faint optical shell and the system's high infra-red luminosity, we argue that either ongoing or past galaxy interactions or a major merger event are a likely mechanism for the triggering of the radio source in NGC 612. This paper is part of an ongoing study to map the large-scale neutral hydrogen properties of nearby radio galaxies and it presents the first example of large-scale HI detected around a powerful Fanaroff & Riley type-II (FR-II) radio galaxy.
DTIC
Cold Gas; Galaxies; Hydrogen; Radio Galaxies

20080041604 Naval Postgraduate School, Monterey, CA USA
Backward FOKKER-PLANCK Equation for Determination of Model Predictability with Uncertain Initial Errors
Chuu, Peter C; Ivanov, Leonid M; Jan 2001; 7 pp.; In English
Report No.(s): AD-A483220; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483220

It is widely recognized that uncertainty in atmospheric and oceanic models can be traced back to two factors. First, in defining the state of atmosphere (or ocean), a number of errors are involved arising from the finite resolution of measurement or from discretization in a numerical experiment, as a result of which small-scale 'subgrid' processes are either discarded or parameterized. Second, once present, small errors of the kind mentioned above trigger a complex response leading to their subsequent amplification. The model predictability versus boundary condition error was discussed by Chu (1999) using the Lorenz system. The model predictability can be measured by two parameters: instantaneous error (IE) and predictability time (PT). The IE and PT are used for models with and without given initial condition errors, respectively. In this study, the authors first develop a theoretical framework for predictability evaluation using the PT measure, and then they illustrate its usefulness using the one-dimensional probabilistic error growth model proposed by Nicolis (1992).
DTIC
Atmospheric Models; Error Analysis; Errors; Fokker-Planck Equation; Mathematical Models; Ocean Models; Predictions

20080041605 Naval Postgraduate School, Monterey, CA USA
Second Kind Predictability of Climate Models
Chu, Peter C; Lu, Shihua; Nov 2003; 7 pp.; In English
Report No.(s): AD-A483221; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483221

Atmospheric and oceanic numerical models are usually initial-value and/or boundary-value problems. Change in either initial or boundary conditions leads to a variation of model solutions. Much of the predictability research has been done on the response of model behavior to an initial value perturbation. Less effort has been made on the response of model behavior to a boundary value perturbation. In this study, the authors use the latest version of the National Center for Atmospheric Research's (NCAR) Community Climate Model (CCM3) to study the model uncertainty to tiny sea surface temperature (SST) errors. The results show the urgency of investigating the second kind predictability problem for climate models.
DTIC
Air Water Interactions; Atmospheric Models; Climate Models; Climatology; Ocean Models; Ocean Surface; Perturbation; Predictions; Sea Surface Temperature; Surface Temperature

20080041649 Naval Research Lab., Bay Saint Louis, MS USA
Summer Generation of the Southern Gulf of California Eddy Train
Zamudio, Luis; Hogan, Patrick J; Metzger, E J; Jun 24, 2008; 22 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-PE0602435N
Report No.(s): AD-A483851; NRL/JA/7320-07-7217; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483851

Ocean color and sea surface temperature satellite-observations show the existence of a series of anticyclonic eddies along the axis of the southern Gulf of California (SGOC). To investigate the summer generation of these eddies, a regional version of the HYbrid Coordinate Ocean Model (HYCOM) has been configured for the GOC and has been nested inside the global model. A Suite of experiments, using the nested GOC model, was developed and used to isolate the effects of the local wind and the effects of the oceanic remote forcing On the generation of the SGOC eddies The results indicate that the local wind is not essential for the generation of these eddies rather it is the oceanic remote forcing. In the SGOC the monthly variability of the currents and sea surface height is mainly due to the deterministic near-coastal poleward eastern boundary currents (PEBC). The interaction of the PEBC with the topographic irregularities (the capes at Topolobampo and Cabo Lobos and the ridges extending...
DTIC
Anticyclones; Gulf of California (Mexico); Ocean Currents; Ocean Models; Summer; Vortices

20080041668 Naval Postgraduate School, Monterey, CA USA

Linear and Nonlinear Perspectives of Forecast Error Estimate Using the First Passage Time

Chu, Peter C; Ivanov, Leonid M; Jan 16, 2002; 7 pp.; In English

Report No.(s): AD-A483888; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483888

Traditionally, the prediction skill of atmospheric models is verified through small amplitude stability analysis. The Lyapunov exponent (LE) and singular vector (SV) decomposition methods are the two popular approaches (e.g. Lorenz, 1984, Dalcher and Kalnay, 1987; Farrell and Ioannou, 1996; Vannitsem and Nicolis, 1997 and others). The model stability is defined as sensitivity to small errors in initial conditions (the first kind of predictability) and measured by an e-folding time computed from the leading LE (or SV). However, finite amplitude errors exist in many practical cases for example, in medium-range predictions (Vukicevic, 1991; Barkmeijer, 1996) or imperfect models (Palmer, 2001 and others). Thus, the analysis should be updated. Herein, one of possible approaches is the probabilistic analysis of forecast error dynamics (e.g., Benzi and Carnavale, 1989, Nicolis 1992; Ehrendorfer 1994 ; Moltineli and Corti, 1998 and others). Naturally, the knowledge of the probability density function (PDF) of error allows to have the full statistical description of its dynamics. However, herein, even one-dimension error dynamics needs to be studied by numerical methods (Ehrendorfer 1994 ; Nicolis 1992). The probabilistic approach can be simplified if we only determine the time when the model prediction skill is lost, i.e. forecast error became larger than a given tolerance level (epsilon). Then, the first passage time can be used as the measure of prediction skill (Ivanov et al., 1994; Ivanov and Margolina, 1999) In the present paper we take such an approach to illustrate its usefulness for analyzing predictability skill of atmospheric and oceanographic models and further understanding how the finite amplitude error affects low-order characteristics of the model prediction skill. To do so we use the modified self-consistent model (Nicolis, 1992) for error propagation and the Princeton Oceanographic Model (POM) for shallow water circulation in a semi-closed basin.

DTIC

Error Analysis; Forecasting; Nonlinearity; Probability Density Functions

20080041720 National Environmental Satellite Service, Camp Springs, MD USA

Operational Utilization of High Resolution Ocean Surface Wind Vectors (25km or Better) in the Marine Forecasting Environment

Chang, Paul S; Sienkiewicz, Joseph; Knabb, Richard; Gaiser, Peter W; Long, David G; Freeberg, Mark; Jan 2004; 17 pp.; In English; Original contains color illustrations

Report No.(s): AD-A484074; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA484074

The work proposed here seeks to exploit currently and soon to be available satellite ocean surface vector wind data in the operational weather forecasting environment. This work will build upon an ongoing effort to quantify the impacts of QuikSCAT ocean vector wind data in the operational short-term warnings and forecasts issued by the NWS Ocean Prediction Center (OPC), and extends the effort to include the NWS Tropical Prediction Center and OCENS, Inc., a small company specializing in ocean and weather monitoring tools and services for the commercial and recreational marine users. In addition to the standard 25km wind vector products from QuikSCAT, this effort will also investigate the impacts of higher spatial resolution wind vector products (12.5km and higher) and the wind vector retrieval capabilities of WindSAT, a polarimetric microwave radiometer.

DTIC

Forecasting; Ground Wind; High Resolution; Marine Environments; Meteorological Parameters; Ocean Surface; Wind (Meteorology)

20080041729 Miami Univ., Miami, FL USA

Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones

Graber, Hans C; Donelan, Mark A; Brown, Michael G; Slinn, Donald N; Hagen, Scott C; Thompson, Donald R; Jensen, Robert E; Black, Peter G; Powell, Mark D; Guiney, John L; Jan 2004; 7 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-02-1-0150

Report No.(s): AD-A484097; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA484097

The long-term goal of this partnership is to establish an operational forecasting system of the wind field and resulting waves and surge impacting the coastline during the approach and landfall of tropical cyclones. The results of this forecasting system would provide real-time information to the National Hurricane Center during the tropical cyclone season in the Atlantic

for establishing improved advisories for the general public and federal agencies including military and civil emergency response teams. Objectives: (1) To define output products necessary to enhance the guidance skills of the Tropical Cyclone Forecast/Advisory product. (2) To test the model infra-structure that would lead toward better forecast information for landfall hurricane wind, wave, and surge conditions. Several historical storms will be used to assess model infra-structure. (3) To develop the interface that couples high-resolution cyclone wind fields to the selected wind model. (4) To develop a system that couples storm surge and spectral wave models driven by winds specified in 6). (5) Test entire system via a proof-of-concepts approach with data from several historical hurricanes. (6) Test system in semi-operational mode during several hurricane seasons and begin transition to fully operational mode.
DTIC
Cyclones; Forecasting; Hurricanes; Real Time Operation; Storm Surges; Surges; Tropical Storms; Velocity Distribution; Wind (Meteorology); Wind Velocity

20080041894 Naval War Coll., Newport, RI USA
Insurgency Season: The Link between the Intertropical Convergence Zone and Insurgencies in Equatorial Africa
Gabriel, Christopher L; Apr 23, 2008; 40 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484351; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The impact of climatology on an insurgency has received little attention, particularly in the Equatorial region of Africa, where the seasonal north-south shift of the Intertropical Convergence Zone (ITCZ) creates distinct wet and dry seasons throughout the region. During the wet season, widespread flooding and inclement weather dominate, severely impacting ground mobility and air operations, and severely restricting a government's ability to attack insurgents. During the dry season, the skies are generally clear and ground mobility is good, making counterinsurgency operations feasible. An evaluation of insurgencies that occurred from 1979-2007 in Equatorial Africa, coupled with climatological data of the position of the ITCZ, shows that a definite correlation exists between the relative intensity of conflict within an insurgency and the seasonal shift in the ITCZ. When the ITCZ dominated the region, insurgencies tended to be relatively quiescent. As the ITCZ shifted south, insurgencies had a tendency to intensify. Also linked to this correlation is the historical record of U.S. military deployments to the region in response to the intensified fighting within the insurgencies. The repeating pattern is one of heavy insurgent fighting during the latter half of the dry season (March through May), which in turn precipitates a crisis which the U.S. military is then tasked to respond to. The linkage between the ITCZ and the intensity of an insurgency, in light of the historical pattern of U.S. military deployments to Equatorial Africa, can be used by military planners as a planning tool to better allocate forces and schedule exercises within the AFRICOM theater, such that the U.S. military is poised and prepared to respond to any crisis in the region.
DTIC
Africa; Annual Variations; Climatology; Drying; Equatorial Regions

20080042063 National Science and Technology Council, Washington, DC USA
Scientific Assessment of the Effects of Global Change on the USA: A Report of the Committee on Environment and Natural Resources, National Science and Technology Council
May 2008; 272 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483614; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The climate is changing, and these changes are affecting the world around us. In order to deal with the changes that are taking place now and to prepare for those that are likely to happen in the future, decisionmakers need information about global change and its effects on the Nation and the world we live in. This national scientific assessment integrates, evaluates, and interprets the findings of the U.S. Climate Change Science Program (CCSP) and draws from and synthesizes findings from previous assessments of the science, including reports and products by the Intergovernmental Panel on Climate Change (IPCC). It analyzes current trends in global change, both natural and human-induced, and it projects major trends for the future. It analyzes the effects of these changes on the natural environment, agriculture, water resources, social systems, energy production and use, transportation, and human health. It is intended to help inform discussion of the relevant issues by decisionmakers, stakeholders, and the public. As such, this report addresses the requirements for assessment in the Global Change Research Act of 1990. This assessment addresses not only climate change, but also other change in the global environment including water resources, oceans, atmospheric chemistry, land productivity, and ecological systems that may alter the capacity of Earth to sustain life. This broader set of changes is referred to as 'global change,' as defined in the Global Change Research Act. Over the past several years, our understanding of climate variability and change and our ability to estimate their future effects has improved significantly. The conclusions in this assessment build on the vast body of observations, modeling, decision support, and other types of activities conducted under the auspices of CCSP and from

previous assessments of the science. This assessment and the underlying assessments have been subjected to and improved through rigorous peer reviews.
DTIC
Climate; Climate Change; Earth Resources; Ecosystems; Greenhouse Effect; Research and Development; Technologies

20080042115 National Oceanic and Atmospheric Administration, Silver Spring, MD USA
Operational Utilization of High Resolution Ocean Surface Wind Vectors (25km or Better) in the Marine Forecasting Environment
Chang, Paul S; Sienkiewicz, Joseph; Knabb, Richard; Gaiser, Peter W; Long, David G; Freeberg, Mark; Jan 2003; 8 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484442; No Copyright; Avail.: Defense Technical Information Center (DTIC)
The work proposed here seeks to exploit currently and soon to be available satellite ocean surface vector wind data in the operational weather forecasting environment. This work will build upon an ongoing effort to quantify the impacts of QuikSCAT ocean vector wind data in the operational short-term warnings and forecasts issued by the NWS Ocean Prediction Center (OPC), and extends the effort to include the NWS Tropical Prediction Center and OCENS, Inc, a small company specializing in ocean and weather monitoring tools and services for the commercial and recreational marine users. In addition to the standard 25km wind vector products from QuikSCAT, this effort will also investigate the impacts of higher spatial resolution wind vector products (12.5km and higher) and the wind vector retrieval capabilities of WindSAT, a polarimetric microwave radiometer. This effort aims to operationally generate and distribute a gridded wind vector analysis and forecast product out of the OPC and TPC to end user participants (US Coast Guard and OCENS Inc.) who will provide feedback on the product impacts and utility. The National Environmental Satellite, Data and Information Service (NESDIS) will generate and provide a gridded wind field product utilizing all available satellite remote sensing data to the MPC and the TPC. These gridded wind field products will cover the areas of responsibility (AORs) for OPC and TPC, and will serve as the basis for the gridded wind vector analysis and forecast products generated by OPC and TPC. We also seek to investigate improvements to the currently available standard wind vector product that will yield positive impacts in its operational utilization. In particular, ambiguity removal processing and quality flagging improvements in adverse weather conditions will be studied along with the potential of retrieving higher resolution (< 25km) wind vector products.
DTIC
Air Water Interactions; Forecasting; Ground Wind; High Resolution; Marine Environments; Marine Meteorology; Ocean Surface; Vector Analysis; Wind (Meteorology)

20080042228 Meteorological Satellite Center, Kiyose, Japan
Monthly Report of the Meteorological Satellite Center: May 2008
May 2008; In English; Copyright; Avail.: Other Sources
These CD-ROMs contain the Monthly Report of observation data derived from MTSAT-1R and the polar orbital meteorological satellite NOAA. This Monthly Report contains image data observed by the following 4 channels and processed satellite product data from the observation data. IR:Infrared (10.3-11.3 microns), VS:Visible (0.55-0.90 microns), WV:Water Vapor (6.5-7.0 microns), SW:3.8 micron image (3.5-4.0 microns) These CD-ROMs contain the following data. 'Full Disk Earth's Cloud Image' (IR, VS, WV; IR,WV:3 hourly, VS:21,00,03,06,09UTC), 'Cloud Image of Japan and its Vicinity' (IR, VS, WV, SW; IR,WV,SW:hourly, VS:21-09UTC), 'Cloud Motion Wind', 'Water Vapor Motion Wind', 'HRIT Image Data Catalog', 'TOVS (TIROS Operational Vertical Sounder) Vertical Profile of Temperature and Precipitable Water', 'TOVS Total Ozone Amount', 'Aerosol Optical Thickness', 'Snow and Ice Index', 'Sea Surface Temperature' and 'Cloud Grid Information'.
Author
Meteorological Satellites; Atmospheric Sounding; Satellite Observation; Data Acquisition; Data Products; Satellite Imagery; Satellite Sounding

20080042276 National Oceanic and Atmospheric Administration, Seattle, WA, USA
Arctic Report Card, 2007. Tracking Recent Environmental Changes
Oct. 2007; 45 pp.; In English
Report No.(s): PB2008-104447; No Copyright; Avail.: National Technical Information Service (NTIS)
No abstract available
Arctic Regions; Cards

20080042310 NASA Langley Research Center, Hampton, VA, USA

Near-Real Time Cloud Retrievals from Operational and Research Meteorological Satellites

Minnis, Patrick; Nguyen, Louis; Palilonda, Rabindra; Heck, Patrick W.; Spangenberg, Douglas A.; Doelling, David R.; Ayers, J. Kirk; Smith, William L., Jr.; Khaiyer, Mandana M.; Trepte, Qing Z.; Avey, Lance A.; Chang, Fu-Lung; Yost, Chris R.; Chee, Thad L.; Sun-Mack, Szedung; September 15, 2008; 8 pp.; In English; SPIE Europe Remote Sensing 2008, 15-19 Sep. 2008, Cardiff, UK; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 389018.02.15.02.33

Report No.(s): Meeting Paper No. 7102-2; Copyright; Avail.: CASI: A02, Hardcopy

A set of cloud retrieval algorithms developed for CERES and applied to MODIS data have been adapted to analyze other satellite imager data in near-real time. The cloud products, including single-layer cloud amount, top and base height, optical depth, phase, effective particle size, and liquid and ice water paths, are being retrieved from GOES- 10/11/12, MTSAT-1R, FY-2C, and Meteosat imager data as well as from MODIS. A comprehensive system to normalize the calibrations to MODIS has been implemented to maximize consistency in the products across platforms. Estimates of surface and top-of-atmosphere broadband radiative fluxes are also provided. Multilayered cloud properties are retrieved from GOES-12, Meteosat, and MODIS data. Native pixel resolution analyses are performed over selected domains, while reduced sampling is used for full-disk retrievals. Tools have been developed for matching the pixel-level results with instrumented surface sites and active sensor satellites. The calibrations, methods, examples of the products, and comparisons with the ICESat GLAS lidar are discussed. These products are currently being used for aircraft icing diagnoses, numerical weather modeling assimilation, and atmospheric radiation research and have potential for use in many other applications.

Author

Meteorological Satellites; Clouds; Data Acquisition; Data Retrieval; Algorithms; Data Products; Real Time Operation; Data Processing; Image Analysis

20080042337 National Weather Service, La Crosse, WI, USA

This Day in Weather History for Southeast Minnesota, Northeast Iowa, and Western Wisconsin

Rieck, T.; Boyne, J.; January 2007; 181 pp.; In English

Report No.(s): PB2008-104276; No Copyright; Avail.: National Technical Information Service (NTIS)

A wide range of weather affects the Upper Mississippi River Valley, with all the seasons well represented. Residents in the National Weather Service - La Crosse area of responsibility (southeast Minnesota, northeast Iowa, and western Wisconsin, see Fig.1 and Table 1) have experienced a vast array of weather conditions: tornadoes and hail, floods and droughts, heat waves and cold outbreaks, and winter storms. This document attempts to identify some of the most significant weather events throughout the area, for each day of the year from 1850 through 2004. Some of the more major events have been expounded upon in greater detail and some all-time records for various locations have also been included. It is hoped that this document can serve as an unofficial history of the recorded weather for the area, providing interesting weather tidbits and facts for the entire year. The information in this document has been divided into several sections. This first section provides an introduction, including sources for the information and a map of the area covered. The second section consists of relatively short, but detailed summaries of different significant weather events that affected the region during its climate history. The third section contains a calender day record of significant climate and/or severe weather events throughout the region. Finally, an appendix contains a listing of all-time temperature and precipitation records for 22 sites across this part of the Upper Mississippi River Valley, information for severe weather, and information and charts for heat and wind chill indices.

NTIS

Iowa; Minnesota; Wisconsin

20080042338 National Centers for Environmental Prediction, Silver Spring, MD USA

Climate of Riverton, Wyoming. Narrative Summary

January 2007; 69 pp.; In English

Report No.(s): PB2008-104273; No Copyright; Avail.: National Technical Information Service (NTIS)

Observations taken by dedicated cooperative weather observers in Riverton date back to 1907, even though the National Weather Service (NWS) office on the northwest edge of town did not come into existence until 1995. Until that time, NWS observations were taken in Lander, which date back to the late 19th century. Official NWS observations are now taken by an automated surface observing system (ASOS) at the Riverton Regional Airport. The airport is located on the northwest side of town and sits nearly 600 feet higher than downtown Riverton. However, a cooperative weather observer in Riverton is currently taking daily weather observations to keep the record database intact back to 1907. These records are archived at the National Climatic Data Center (NCDC). Since these cooperative weather observers are volunteers, the record database has

some missing data due to observers going on vacation or their unavailability during transition from one observer to another. However, the available data is impressive and was interrogated to create this published climate volume. Cooperative weather observations were used exclusively for this work and all observations were taken in the town of Riverton.
NTIS
Climate; Climatology

20080042357 Meteorological Satellite Center, Kiyose, Japan
Monthly Report of the Meteorological Satellite Center: June 2008
June 2008; In English; Copyright; Avail.: Other Sources

These CD-ROMs contain the Monthly Report of observation data derived from MTSAT-1R and the polar orbital meteorological satellite NOAA. This Monthly Report contains image data observed by the following 4 channels and processed satellite product data from the observation data. IR: Infrared (10.-11.3 microns), VS:Visible (0.55-0.90 microns), WV:Water Vapor (6.5-7.0 microns), SW:3.8 micron image (3.5-4.0 microns). These CD-Roms contain the following data: 'Full Disk Earth's Cloud Image'; 'Cloud Image of Japan and its Vicinity'; 'Cloud Motion Wind'; 'Water Vapor Motion Wind'; 'HRIT Image Data Catalog'; 'TOVS (TIROS Operational Vertical Sounder) Vertical Profile of Temperature and Precipitable Water'; 'TOVS Total Ozone Amount'; 'Aerosol Optical Thickness'; 'Snow and Ice Index'; 'Sea Surface Temperature'; and 'Cloud Grid Information.'
Author
Meteorological Satellites; Satellite Observation; Satellite Imagery; Data Acquisition; Data Products; NOAA Satellites

20080042403 NASA Langley Research Center, Hampton, VA, USA
Cloud and Thermodynamic Parameters Retrieved from Satellite Ultraspectral Infrared Measurements
Zhou, Daniel K.; Smith, William L.; Larar, Allen M.; Liu, Xu; Taylor, Jonathan P.; Schluessel, Peter; Strow, L. Larrabee; Mango, Stephen A.; September 15, 2008; 12 pp.; In English; SPIE Europe Remote Sensing 2008, 15-19 Sep. 2008, Cardiff, UK; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 509496.02.01.01.03; Copyright; Avail.: CASI: A03, Hardcopy

Atmospheric-thermodynamic parameters and surface properties are basic meteorological parameters for weather forecasting. A physical geophysical parameter retrieval scheme dealing with cloudy and cloud-free radiance observed with satellite ultraspectral infrared sounders has been developed and applied to the Infrared Atmospheric Sounding Interferometer (IASI) and the Atmospheric InfraRed Sounder (AIRS). The retrieved parameters presented herein are from radiance data gathered during the Joint Airborne IASI Validation Experiment (JAIVEx). JAIVEx provided intensive aircraft observations obtained from airborne Fourier Transform Spectrometer (FTS) systems, in-situ measurements, and dedicated dropsonde and radiosonde measurements for the validation of the IASI products. Here, IASI atmospheric profile retrievals are compared with those obtained from dedicated dropsondes, radiosondes, and the airborne FTS system. The IASI examples presented here demonstrate the ability to retrieve fine-scale horizontal features with high vertical resolution from satellite ultraspectral sounder radiance spectra.
Author
Atmospheric Sounding; Infrared Interferometers; Remote Sensing; Clouds; Thermodynamic Properties; Surface Properties; Meteorological Parameters; Data Retrieval

20080042404 NASA Langley Research Center, Hampton, VA, USA
Evaluation of Cloud Physical Properties of ECMWF Analysis and Re-Analysis (ERA-40 and ERA Interim) against CERES Tropical Deep Convective Cloud Object Observations
Xu, Kuan-Man; EMS8/ECAC7 Abstracts; September 28, 2008; Volume 5; 2 pp.; In English; 8th Annual Meeting of European Meteoroogical Society, 28 Sep. - 3 Oct. 2008, Amsterdam, Netherlands
Contract(s)/Grant(s): WBS 720817.04.12.01.46
Report No.(s): EMS2008-A-00196; No Copyright; Avail.: Other Sources; Abstract Only

This study presents an approach that converts the vertical profiles of grid-averaged cloud properties from large-scale models to probability density functions (PDFs) of subgrid-cell cloud physical properties measured at satellite footprints. Cloud physical and radiative properties, rather than just cloud and precipitation occurrences, of assimilated cloud systems by the European Center for Medium-range Weather Forecasts (ECMWF) operational analysis (EOA) and ECMWF Re-Analyses (ERA-40 and ERA Interim) are validated against those obtained from Earth Observing System satellite cloud object data for January-August 1998 and March 2000 periods. These properties include ice water path (IWP), cloud-top height and

temperature, cloud optical depth and solar and infrared radiative fluxes. Each cloud object, a contiguous region with similar cloud physical properties, is temporally and spatially matched with EOA and ERA-40 data. Results indicate that most PDFs of EOA and ERA-40 cloud physical and radiative properties agree with those of satellite observations of the tropical deep convective cloud-object type for the January-August 1998 period. There are, however, significant discrepancies in selected ranges of the cloud property PDFs such as the upper range of EOA cloud top height. A major discrepancy is that the dependence of the PDFs on the cloud object size for both EOA and ERA-40 is not as strong as in the observations. Modifications to the cloud parameterization in ECMWF that occurred in October 1999 eliminate the clouds near the tropopause but shift power of the PDF to lower cloud-top heights and greatly reduce the ranges of IWP and cloud optical depth PDFs. These features persist in ERA-40 due to the use of the same cloud parameterizations. The downgrade of data assimilation technique and the lack of snow water content information in ERA-40, not the coarser horizontal grid resolution, are also responsible for the disagreements with observed PDFs of cloud physical properties although the detection rates of cloud object occurrence are improved for small size categories. A possible improvement to the convective parameterization is to introduce a stronger dependence of updraft penetration heights with grid-cell dynamics. These conclusions will be rechecked using the ERA Interim data, due to recent changes in the ECMWF convective parameterization (Bechtold et al. 2004, 2008). Results from the ERA Interim will be presented at the meeting.
Author
Cloud Physics; Weather Forecasting; Climate Models; Satellite Observation; Data Acquisition; Data Integration; Probability Density Functions

20080042406 NASA Kennedy Space Center, Cocoa Beach, FL, USA
Anvil Forecast Tool in the Advanced Weather Interactive Processing System, Phase II
Barrett, Joe H., III; August 2008; 26 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): NNK06MA70C
Report No.(s): NASA/CR-2008-214748; No Copyright; Avail.: CASI: C01, CD-ROM: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080042406

Meteorologists from the 45th Weather Squadron (45 WS) and Spaceflight Meteorology Group have identified anvil forecasting as one of their most challenging tasks when predicting the probability of violations of the Lightning Launch Commit Criteria and Space Light Rules. As a result, the Applied Meteorology Unit (AMU) created a graphical overlay tool for the Meteorological Interactive Data Display Systems (MIDDS) to indicate the threat of thunderstorm anvil clouds, using either observed or model forecast winds as input.
Author
Meteorological Parameters; Probability Theory; Thunderstorms; Anvil Clouds; Lightning; Predictions; Forecasting; Meteorology

20080042407 NASA Kennedy Space Center, Cocoa Beach, FL, USA
User Guide for the Anvil Threat Cooridor Forecast Tool V2.4 for AWIPS
Barett, Joe H., III; Bauman, William H., III; August 2008; 32 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): NNK06MA70C
Report No.(s): NASA/CR-2008-214749; No Copyright; Avail.: CASI: C01, CD-ROM: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080042407

The Anvil Tool GUI allows users to select a Data Type, toggle the map refresh on/off, place labels, and choose the Profiler Type (source of the KSC 50 MHz profiler data), the Date- Time of the data, the Center of Plot, and the Station (location of the RAOB or 50 MHz profiler). If the Data Type is Models, the user selects a Fcst Hour (forecast hour) instead of Station. There are menus for User Profiles, Circle Label Options, and Frame Label Options. Labels can be placed near the center circle of the plot and/or at a specified distance and direction from the center of the circle (Center of Plot). The default selection for the map refresh is 'ON'. When the user creates a new Anvil Tool map with Refresh Map 'ON, the plot is automatically displayed in the AWIPS frame. If another Anvil Tool map is already displayed and the user does not change the existing map number shown at the bottom of the GUI, the new Anvil Tool map will overwrite the old one. If the user turns the Refresh Map 'OFF', the new Anvil Tool map is created but not automatically displayed. The user can still display the Anvil Tool map through the Maps dropdown menu* as shown in Figure 4.
Derived from text
Anvil Clouds; Graphical User Interface; Meteorological Parameters; User Manuals (Computer Programs); Wind Measurement; Meteorology

20080042417 NASA Langley Research Center, Hampton, VA, USA

Climate Quality Broadband and Narrowband Solar Reflected Radiance Calibration Between Sensors in Orbit

Wielicki, Bruce A.; Doelling, David R.; Young, David F.; Loeb, Norman G.; Garber, Donald P.; MacDonnell, David G.; July 06, 2008; 4 pp.; In English; 2008 IEEE IGARSS, 6-11 Jul. 2008, Boston, MA, USA; Original contains color illustrations

Contract(s)/Grant(s): 921266.04.07.07.01

Report No.(s): Meeting Paper No. MO4.109.4; No Copyright; Avail.: CASI: A01, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080042417

vAs the potential impacts of global climate change become more clear [1], the need to determine the accuracy of climate prediction over decade-to-century time scales has become an urgent and critical challenge. The most critical tests of climate model predictions will occur using observations of decadal changes in climate forcing, response, and feedback variables. Many of these key climate variables are observed by remotely sensing the global distribution of reflected solar spectral and broadband radiance. These 'reflected solar' variables include aerosols, clouds, radiative fluxes, snow, ice, vegetation, ocean color, and land cover. Achieving sufficient satellite instrument accuracy, stability, and overlap to rigorously observe decadal change signals has proven very difficult in most cases and has not yet been achieved in others [2]. One of the earliest efforts to make climate quality observations was for Earth Radiation Budget: Nimbus 6/7 in the late 1970s, ERBE in the 1980s/90s, and CERES in 2000s are examples of the most complete global records. The recent CERES data products have carried out the most extensive intercomparisons because if the need to merge data from up to 11 instruments (CERES, MODIS, geostationary imagers) on 7 spacecraft (Terra, Aqua, and 5 geostationary) for any given month. In order to achieve climate calibration for cloud feedbacks, the radiative effect of clear-sky, all-sky, and cloud radiative effect must all be made with very high stability and accuracy. For shortwave solar reflected flux, even the 1% CERES broadband absolute accuracy (1-sigma confidence bound) is not sufficient to allow gaps in the radiation record for decadal climate change. Typical absolute accuracy for the best narrowband sensors like SeaWiFS, MISR, and MODIS range from 2 to 4% (1-sigma). IPCC greenhouse gas radiative forcing is approx. 0.6 W/sq m per decade or 0.6% of the global mean shortwave reflected flux, so that a 50% cloud feedback would change the global reflected flux by approx. 0.3 W/sq m or 0.3% per decade in broadband SW calibration change. Recent results comparing CERES reflected flux changes with MODIS, MISR, and SeaWiFS narrowband changes concluded that only SeaWiFS and CERES were approaching sufficient stability in calibration for decadal climate change [3]. Results using deep convective clouds in the optically thick limit as a stability target may prove very effective for improving past data sets like ISCCP. Results for intercalibration of geostationary imagers to CERES using an entire month of regional nearly coincident data demonstrates new approaches to constraining the calibration of current geostationary imagers. The new Decadal Survey Mission CLARREO is examining future approaches to a 'NIST-in-Orbit' approach of very high absolute accuracy reference radiometers that cover the full solar and infrared spectrum at high spectral resolution but at low spatial resolution. Sampling studies have shown that a precessing CLARREO mission could calibrate other geo and leo reflected solar radiation and thermal infrared sensors.

Author

Climatology; Clouds (Meteorology); Sea-Viewing Wide Field-of-View Sensor; Remote Sensing; Reflected Waves; Atmospheric Sounding; Climate Models; Climate Change; Calibrating; MODIS (Radiometry)

48
OCEANOGRAPHY

Includes the physical, chemical and biological aspects of oceans and seas; ocean dynamics; and marine resources. For related information see also *43 Earth Resources and Remote Sensing*.

20080042301 NASA Langley Research Center, Hampton, VA, USA

AERONET-OC: Strengths and Weaknesses of a Network for the Validation of Satellite Coastal Radiometric Products

Zibordi, Giuseppe; Holben, Brent; Slutsker, Ilya; Giles, David; D'Alimonte, Davide; Melin, Frederic; Berthon, Jean-Francois; Vandemark, Doug; Feng, Hui; Schuster, Gregory; Fabbri, Bryan E.; Kaitala, Seppo; Seppala, Jukka; October 06, 2008; 1 pp.; In English; Ocean Optics 19th, 6-10 Oct. 2008, Tuscany, Italy

Contract(s)/Grant(s): WBS 921266.04.07.07; Copyright; Avail.: Other Sources; Abstract Only

The Ocean Color component of the Aerosol Robotic Network (AERONET-OC) has been implemented to support long-term satellite ocean color investigations through cross-site consistent and accurate measurements collected by autonomous radiometer systems deployed on offshore fixed platforms. The ultimate purpose of AERONET-OC is the production of standardized measurements performed at different sites with identical measuring systems and protocols, calibrated using a single reference source and method, and processed with the same code. The AERONET-OC primary data

product is the normalized water leaving radiance determined at center-wavelengths of interest for satellite ocean color applications, with an uncertainty lower than 5% in the blue-green spectral regions and higher than 8% in the red. Measurements collected at 6 sites counting the northern Adriatic Sea, the Baltic Proper, the Gulf of Finland, the Persian Gulf, and, the northern and southern margins of the Middle Atlantic Bay, have shown the capability of producing quality assured data over a wide range of bio-optical conditions including Case-2 yellow substance- and sedimentdominated waters. This work briefly introduces network elements like: deployment sites, measurement method, instrument calibration, processing scheme, quality-assurance, uncertainties, data archive and products accessibility. Emphases is given to those elements which underline the network strengths (i.e., mostly standardization of any network element) and its weaknesses (i.e., the use of consolidated, but old-fashioned technology). The work also addresses the application of AERONET-OC data to the validation of primary satellite radiometric products over a variety of complex coastal waters and finally provides elements for the identification of new deployment sites most suitable to support satellite ocean color missions.
Author
Oceanography; Water Color; Radiometers; Data Products; Standardization

51
LIFE SCIENCES (GENERAL)

Includes general research topics related to plant and animal biology (non-human); ecology; microbiology; and also the origin, development, structure, and maintenance of animals and plants in space and related environmental conditions. For specific topics in life sciences see *categories 52 through 55*.

20080040952 Belgrade Univ., Serbia
Multi-tasking in Laser Scanning Confocal Microscopy towards Cell Profiling
Andjus, Pavle R.; Bajic, Aleksandar; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 6 pp.; In English; See also 20080040944; Original contains black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The aim of this paper is to present a concept of modern biomedical microscopy which unites high-throughput automated systems with laser scanning confocal microscopy. This approach is only attainable with a dedicated and efficient software. These techniques of cell imaging and profiling are still developing and the field is open for innovative software solutions. Recent technical developments in molecular biology and biochemistry, such as PCR (‘polymerize chain reaction’) or microarray technology have paved the road to high-throughput biophysical profiling of cellular markers. However, quantification of cellular changes caused by external perturbations is generally limited to populationlevel transcription and proteomic profiling techniques. However, complex cellular processes may not be tackled by such one-dimensional readouts at constant drug concentrations.
Author
Cytology; Imaging Techniques; Laser Applications; Microscopy; Molecular Biology; Cells (Biology)

20080041046 Agency for Toxic Substances and Disease Registry, Atlanta, GA, USA
Health Consultation: Colonie Site (Aliases: Colonie Interim Storage Site and Formerly National Lead Industries), Colonie, Albany County, New York. EPA Facility ID: NY0890137854
Oct. 05, 2004; 144 pp.; In English
Report No.(s): PB2008-104047; No Copyright; Avail.: National Technical Information Service (NTIS)

NL obtained the depleted uranium under a license from what is now the U.S. Department of Energy. NL reduced depleted uranium tetrafluoride to depleted uranium metal, with which it manufactured shielding components, ballast weights, and projectiles. In addition, from 1966 to 1972, NL processed fuel from enriched uranium for use in experimental nuclear reactors (ACE 2001b). These operations generated stack emissions, which released DU into the air. Some of these stack emissions eventually settled on residential and commercial properties and structures near the plant. At a July 11, 2001 public meeting held by the U.S. Army Corps of Engineers (ACE), several community members expressed concern about potentially adverse health effects from past operations at NLs Colonie facility. In response to those concerns, ACE requested that the Agency for Toxic Substances and Disease Registry (ATSDR) conduct an independent public health evaluation of potential exposures to

the community from past Colonie Site operations. In that evaluation ATSDR identified three issues regarding how people were exposed or might be exposed to contamination from the Colonie Site.
NTIS
Health; Industries; New York; Public Health; Spent Fuels; Uranium

20080041068 Virginia Commonwealth Univ., Richmond, VA USA
Defining the Regulation of Telomerase Through Identification of Mammary-Specific Telomerase Interacting Proteins
Holt, Shawn E; Jun 2007; 15 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-04-1-0511
Report No.(s): AD-A483163; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483163

Telomerase activity is associated with over 90% of human breast cancers and is necessary for continued tumor cell growth, making it an ideal target for inhibition therapy. However, pharmacologic inhibitors of telomerase have not been as effective as expected. As such, our objective here is to identify novel telomerase interacting proteins and define their functional relationship to telomerase in order to provide additional targets for telomerase inhibition in breast cancer. In addition to the results that we reported in previous annual reports concerning telomere binding proteins and chaperone interactions, we have found that telomerase is a modified protein, capable of being ubiquinated and sumolylated and is able to be degraded via both nuclear and cytoplasmic mechanisms. We show that inhibition of the Hsp90 chaperone results in telomerase degradation in the nucleus, but association of wild-type telomerase with a dominant-negative version results in cytoplasmic degradation. We show that telomerase is associated with the proteosome in both the nucleus and cytoplasm and that this alternative regulation of telomerase is key for functionally blocking its activity as an adjuvant target for chemotherapeutics for breast cancer.
DTIC
Antibodies; Breast; Cancer; Mammary Glands; Proteins

20080041069 Michigan Univ., Ann Arbor, MI USA
Preclinical Testing the Therapeutic Potential of a Potent and Novel Small-molecule Inhibitor of Bc1-2 as a Novel Therapy for Hormone-refractory Prostate Cancer
Wang, Shaomeng; Dec 2007; 14 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-05-1-0128
Report No.(s): AD-A483164; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483164

Targeting the anti-apoptotic Bcl-2 members using non-peptide, small-molecule inhibitors is a new and exciting therapeutic strategy. Our work has led to the discovery of potent, non-peptide small-molecule inhibitor apogossypolone that not only binds to Bcl-2 and Bcl-xL proteins but also Mcl-1. Consistent with its strong binding affinity to Bcl-2 members, apogossypolone potently and effectively inhibits cancer cell growth in androgen-independent human prostate cancer PC-3 and DU-145 cell lines. Apogossypolone is well-tolerated in animals and has an excellent oral bioavailability. Our studies using the PC-3 androgen-independent xenograft model showed that Apogossypolone can enhance the antitumor activity of taxotere without causing any additional signs of toxicity, as compared to taxotere alone. Apogossypolone may have a promising therapeutic potential to be developed as an effective and non-toxic new therapy for the treatment of advanced, androgen-independent human prostate cancer.
DTIC
Cancer; Hormones; Inhibitors; Prostate Gland; Refractories; Therapy

20080041070 Weizmann Inst. of Science, Rehovot, Israel
Project 3 - Molecular Evolution of Human PON to Design Enhanced Catalytic Efficiency for Hydrolysis of Nerve Agents
Tawfik, Dan; Sussman, J L; Feb 2008; 15 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-07-2-0020
Report No.(s): AD-A483166; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483166

The long-term objective of this effort is to develop a generic gene shuffling-based technology to rapidly screen libraries of 1010 proteins/peptides encoded by DNA libraries for identifying biomolecules that can intercept both existing and emerging organophosphate-based chemical warfare nerve agents (CWNA). The specific milestones for year 1 were (a) Proof of concept

for the proposed technology; (b) Generation of 4-6 libraries based on recombinant PON1 and PON3 based on gene shuffling and random mutations (c) synthesis of OP model compounds. In general all 1st year milestones were met and well beyond specifically (i) the generation of recombinant PON3 variants and (ii) generation of recombinant PON1 variants two of them (3B3 and 2B4) were overexpressed purified and found to have a 72- and 13-fold increased kcat/Km relative to the wild-type like enzyme toward a cyclosarin model compound. Notably the increased activity of these variants seems to be highly selective e.g. the activity of the two variants with the diethyl phosphoryl analog DEPCyC shows one to be lower and the other to be only 3-fold higher than the wild-type PON1. Relevance: this technology is envisaged to provide rapid discovery of pretreatment and post challenge therapeutic drugs against existing and emerging CWNA threats and will shorten the time from emergence of a threat to identification of potential counter-measures to a few days or weeks.
DTIC
Catalysis; Hydrolysis; Molecules; Nerves

20080041071 Mount Sinai School of Medicine, New York, NY USA
Restoration of Wild-Type Activity to Mutant p53 in Prostate Cancer: A Novel Therapeutic Approach
Manfredi, James J; Jan 2008; 12 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-05-1-0109
Report No.(s): AD-A483167; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483167

A summary is presented of research performed during three years of a project to determine feasibility of approaches to restore wild-type transcriptional activity on mutant p53 proteins found in human prostate tumors. p53 mutant proteins that are specifically relevant to prostate cancer were examined to determine whether they are suitable targets for such an approach. Three specific aims were pursued. The first was characterizing the interaction of p53 with two distinct classes of its response elements. The second aim was determining the role of mutant p53 proteins in prostate cancer cell proliferation. The final aim was to explore approaches to restore wild-type function to mutant p53 proteins found in prostate cancer. The long-term goals of this research were to identify small molecular weight compounds that have the novel activity of restoring wild-type function to prostate cancer-derived mutant p53 proteins. As such, this represented a preclinical development of highly targeted therapy with the hope of establishing highly effective and tumor-specific treatments of human prostate cancer.
DTIC
Cancer; Deoxyribonucleic Acid; Prostate Gland; Restoration; Therapy

20080041072 Institute for Cancer Research, Philadelphia, PA USA
Do Deregulated Cas Proteins Induce Genomic Instability In Early Stage Ovarian Cancer?
Golemis, Erica; Dec 2007; 60 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-06-1-0073; CA63366
Report No.(s): AD-A483168; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483168

Increased genomic instability arising from centrosomal amplification has been proposed to be an important factor causing development of traits associated with highly malignant ovarian tumors, including multidrug resistance and increased tendency to metastasis. This proposal addresses the hypothesized interaction between the Cas proteins (HEF1 and p130Cas), Aurora A (AurA) and Ajuba as being likely to contribute to genomic instability and metastatic properties of ovarian tumors. Our work in the second project period has defined and performed detailed analysis of the HEF1-AurA-Ajuba complex. This has allowed us to develop a model in which HEF1 and AurA mutually stabilize each other, and HEF1 and Ajuba synergize to promote AurA activation at mitotic entry. At mitotic exit, phosphorylation by AurA promotes HEF1 return to focal adhesions. Excess of HEF1 protects AurA from inhibition by targeted small molecule inhibitors. In the past two years, elevation of HEF1 has been established as important for metastasis and/or invasion in lung cancer, melanoma, and glioblastoma; our ongoing work on this project will determine whether this is also true for ovarian cancer.
DTIC
Cancer; Genome; Metastasis; Ovaries; Proteins

20080041078 Public Health Service, Washington, DC USA

Health Professionals Special Pays Study: Report to Congress on Armed Forces Health Professionals Special Pays -- Other Health Care Providers

Murphy, James F; Ogloblin, Peter; Mirick, Steven C; Buxton, Richard; Sevier, David M; McKelvy, Marcia; Rubino, Frank; Dec 1, 1988; 194 pp.; In English

Report No.(s): AD-A483177; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483177

This supplement to the Report to Congress on Health Professional Special Pays, issued December 1, 1988, reviews accession, retention, and relative compensation status of 13 health care specialties within the military health care system: dentistry, veterinary medicine, optometry, pharmacy, clinical psychology, physical therapy, occupational therapy, audiology, speech pathology, podiatry, social work, dietetics, and physician assistant. One clear finding of this review of health care providers is that the inventory of 'other' health care providers in the military is declining, both in absolute terms, and as compared to authorizations. The FY83 inventory of all 13 disciplines studied was 9949, against 9856 authorizations. By FY88, authorizations were 9730, while inventory had declined to 9374 individuals assigned, a drop of 575, or 6% in 5 years. Some disciplines sustained significant losses, such as Army Optometry, which lost 40% of its force in those years, while others were able to maintain their size fairly well. Various factors have contributed to the relative health of each professional discipline, but substantially it is the outside environment driving up prices and cutting into the supply that has proved most troublesome. An additional difficulty results from the small personnel numbers of most of the 'other' health care disciplines. Small communities can develop management problems when managed within the overall environment of Corps, Military Department, and Defense Officer Personnel Management Act (DOPMA) standards. Complications, such as awarding constructive credit for experience and education may then play havoc with promotion opportunities in small communities constrained by various grade controls, making it particularly difficult to put forth an encouraging career plan for potential recruits.

DTIC

Armed Forces; Congressional Reports; Health; Medical Personnel; Personnel Management

20080041079 Howard Univ., Washington, DC USA

UV Exposure, Vitamin D, and Prostate Cancer Risk in African Americans

Kanaan, Yasmine; Aug 2007; 12 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0069

Report No.(s): AD-A483179; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483179

Genes may play a strong role in prostate cancer etiology but epidemiological studies suggest that prostate cancer risk is largely determined by gene and environmental interactions. In order to explore the effects of UV exposure, serum Vitamin D, and skin color on prostate cancer risk in African American men. Ninety affected AA men with histologically diagnosed adenocarcinoma of the prostate; PSA of > 2.5 ng/ml and a positive DRE were recruited under the direction of Dr. Mireku-Boateng from the division of Urology at the Howard University Hospital and forty age and ethnicity matched controls have been recruited through the monthly free screenings program at the Howard University Cancer Center. For each prostate cancer patient and matched control we have collected information on personal and family history, and blood samples for candidate gene testing. In order to measure the intake of dietary Vitamin D each subject completed the standardized food frequency questionnaire and the serum circulating levels of 25-OH Vitamin D have been measured by Enzyme Immunoassay for all participants. To elucidate their exposure to UV from childhood until current the UV exposure questionnaire has been completed. In addition their constitutive skin color (M-index) measured has been done by using the dermaspectrophotometer.

DTIC

Africa; Calciferol; Cancer; Exposure; Prostate Gland; Risk; Ultraviolet Radiation

20080041080 Texas Univ., Brownsville, TX USA

Interrelationships of Hormones, Diet, Body Size and Breast Cancer among Hispanic Women

Peltz, Gerson; Sep 2007; 56 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0274

Report No.(s): AD-A483180; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483180

The purpose of this Minority Institution Partnership Training Award is to train University of Texas at Brownsville (UTB) faculty to conduct breast cancer research by collaborating with faculty from the University of Texas-Houston School of Public

Health (UTSPH). Three UTB faculty will undergo intensive training provided by six UTSPH faculty during year 1. To reinforce training, faculty from UTB and UTSPH will conduct a clinic-based case-control study of breast cancer to investigate its' association with hormones, diet and body size in years 2 through 4. Specific aims include: 1) to provide UTB faculty training through classes, presentations and seminars to gain knowledge of epidemiology, proposal development, behavioral sciences, and biostatistics offered by UTSPH faculty, and 2) to design and conduct a clinic-based case-control study to include completion of a questionnaire, anthropometry and a blood draw. During the fourth year of the project, data collection continued for the clinic-based case-control study, the South Texas Women s Health Project. To increase the number of breast cancer cases, we attempted to include Hidalgo county by teaming up with an investigator from the University of Texas Medical Branch. Dr. Sanderson (UTSPH) continued in her role as principal investigator of a project funded by the National Center on Minority Health and Health Disparities to conduct a study of women diagnosed with high risk-human papillomavirus which places them at high risk of cervical cancer, and as principal investigator of a grant from the Texas Cancer Council to investigate the utility of electronic pathology lab reporting the to the Texas Cancer Registry on the Texas-Mexico border. Dr. Sanderson (UTSPH) and Dr. Nair (UTB) submitted a Synergistic Idea Award application to conduct a substudy of the South Texas Women's Health Project to investigate genes associated with obesity and diabetes.
DTIC
Breast; Cancer; Diets; Females; Hormones; Mammary Glands; Medical Science

20080041081 Children's Hospital Medical Center, Boston, MA USA
DRF as a Cholesterol Dependent Regulator of Src in Prostate Cancer
Freeman, Michael R; Jan 2008; 10 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-06-1-0197
Report No.(s): AD-A483182; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483182

This project focuses on the novel finding from our group that the diaphanous-related formin protein DRF3 is a signaling molecule positioned downstream from the EGF receptor that intersects with the sine kinase Src in prostate cancer cells. Formins are effectors of small Rho-family GTPases like and provide a direct link between activated membrane receptors and the actin cytoskeleton. They also regulated by a large number of other activators including Src homology 3 (SH3)-containing adaptor proteins and Src family kinases, and can therefore serve as signal integrating platforms inside cell. Evidence was presented in the original proposal that the EGFR Drf3 Src signaling circuit appears to traverse cholesterol-rich lipid raft membranes in prostate cancer cells. Lipid rafts are cholesterol- and sphingolipid-enriched membrane microdomains that serve as signal transduction platforms sequestering and excluding signaling proteins and by harboring pre-formed multiprotein complexes. have hypothesized in this project, and in our published work in this area, that cholesterol accumulation in prostate cancer cells may promote oncogenesis by altering the nature of and/or the of signals that flow through lipid raft microdomains. Several new lines of evidence consistent this hypothesis have been produced in year 2 and are described and summarized in this report.
DTIC
Cancer; Cholesterol; Prostate Gland; Proteins; Regulators

20080041082 Texas Univ., Houston, TX USA
IMPACT (Imaging and Molecular Markers for Patients with Lung Cancer: Approaches with Molecular Targets and Complementary, Innovative and Therapeutic Modalities)
Hong, Waun K; Herbst, Roy; Mar 2008; 68 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-05-2-0027
Report No.(s): AD-A483184; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483184

The projects in this proposal specifically target several signal transduction pathways known to be critical for NSCLC pathogenesis including the EGFR pathway and the more downstream ras/raf/Mek/ERK pathway. These projects combine targeted approaches using molecular and imaging techniques to validate activity against a target and monitor response using imaging modalities specific to the receptor using either small molecules or targeted peptide approaches. The Developmental Research projects explore new areas including 1) the issue of high morbidity malignant pleural effusion thereby bringing the pulmonologists into the treatment of advanced disease with molecular therapies; and 2) prevention of lung cancer in youth through a highly interactive entertaining CD-ROM program.
DTIC
Cancer; Imaging Techniques; Lungs; Markers; Patients; Targets; Therapy

20080041087 Utah Univ., Salt Lake City, UT USA

Evaluation of the Reliability and Validity of the Crawford Classification of Congenital Tibial Dysplasia

Viskochil, David H; Stevenson, David A; Carey, John C; Dec 2007; 23 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-06-1-0130

Report No.(s): AD-A483195; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483195

The objective of this study is to analyze the reliability and validity of a classification system to assess tibial dysplasia in neurofibromatosis type 1. Radiographs of the lower extremity were collected on 36 individuals with NF1 and tibial bowing. Each radiograph (AP and lateral) was scored as either type I, type IIA, type IIB, or type IIC by the author of the peer-reviewed published criteria of Crawford (Crawford AH and Schorry EK. 1999. J Am Academy of Orthopaedic Surgeons; 7:217-230). Dr. Crawford scored 16 as type I, 8 as type IIA, 7 as type IIB, and 5 as type IIC. The same set of radiographs was sent to 27 consented volunteers in the radiology and orthopedic communities, and 21 provided a rating. Each volunteer was asked to re-classify the set of radiographs 3 months later to assess the test-retest reliability. 12 reviewers of the first set re-reviewed the radiographs as a second rating. The analyses are underway and being prepared for submission for publication.

DTIC

Classifications; Congenital Anomalies; Growth; Reliability; Tibia

20080041089 Virginia Univ., Charlottesville, VA USA

Identification and Characterization of Ovarian Carcinoma Peptide Epitopes Recognized by Cytotoxic T Lymphocytes

Hogan, Kevin T; Nov 2007; 57 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0012

Report No.(s): AD-A483197; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483197

The purpose of the research is to identify new ovarian cancer tumor antigens that can be used in the immunotherapeutic treatment of ovarian cancer. The scope of this work involves (1) identifying the peptide antigens recognized by ovarian reactive cytotoxic T lymphocytes (CTL); and (2) identify peptide antigens within the Her-2/neu, folate binding protein (FBP), and TAG proteins that give rise to ovarian reactive CTL. Eleven ovarian cancer cell lines were characterized for the expression of class I and II MHC expression, 15 tumor antigens, and immunosuppressive cytokines. This is significant because it will facilitate these and other studies. CTL lines were established from seven patients, but none of them appear to recognize a shared antigen and none recognize any of the predicted antigens from FBP, Her-2/neu, or mesothelin. This is significant because it indicates that ovarian cancer cells may not express shared antigens that can be targeted in a vaccine. The FBP gene was cloned and the DNA demethylating agent 5-aza-2 -deoxycytidine was shown to upregulate cancer testis antigen expression and class I MHC expression on ovarian cancer cells. These results are significant because the ability to upregulate antigens on ovarian cancer cells may make them more amenable to immunotherapeutic intervention.

DTIC

Antigens; Cancer; Immune Systems; Lymphocytes; Ovaries; Peptides; Toxins and Antitoxins

20080041091 Texas Univ., Houston, TX USA

V.I.T.A.L. (Vanguard Investigations of Therapeutic Approaches to Lung Cancer)

Hong, Waun K; Lotan, Reuben; Stewart, David; Jan 2008; 258 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0142

Report No.(s): AD-A483202; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483202

The VITAL Research Program will provide a better understanding of the cellular and molecular processes that drive lung tumorigenesis so that an accurate risk model for recurrence and/or the development of the secondary primary tumor can be developed, and the biologic agents most effective in reducing these ovents in the group of high-risk patients can be identified. We will be incorporating retrospective clinical trial specimens to develop our risk model and validating it with specimens collected from our Vanguard study. The research projects are proceeding well as proposed, producing valuable findings with cell lines, and will validate these results using the clinical samples obtained from the VITAL trials in the coming years.

DTIC

Cancer; Lungs; Therapy

20080041092 Helsinki Univ., Helsinki, Finland

Novel Molecular Interactions and Biological Functions of the Neurofibromatosis 2 Tumor Suppressor Protein, Merlin

Carpen, Olli; Aug 2008; 81 pp.; In English

Contract(s)/Grant(s): W81XWH-05-1-0469

Report No.(s): AD-A483204; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483204

The project studies molecular functions of neurofibromatosis 2 tumor suppressor protein merlin and the ERM protein ezrin. Phosphorylation is an important mechanism in theregulation of both proteins. We have studied the interplay between protein kinase A (PKA) andmerlin. We identified an N-terminal phosphorylation site at merlin S10. Phosphorylation of S10 does not affect phosphorylation of S518 or ezrin binding. It affects, however, actin dynamics and cell morphology and migration in Nf2 -/- mouse embryonic fibroblasts (MEF) and Schwann cells. This suggests a role for merlinin mediating PKA induced changes of the actin cytoskeleton. We also show a link between PKA and calpain in the regulation of merlin cleavage and subcellular localization. We previously showed that oncogenic tyronsine kinase Src phosphorylates ezrin at Y477. Using reconstituted MEF cells from ezrin -/- mice we studied the biological importance of Y477 phosphorylation. Our results show that ezrin is a key regulator of Src induced malignant behavior in three dimentional culture conditions.

DTIC

Molecular Interactions; Proteins; Tumor Suppressor Proteins

20080041094 Boston Univ., Boston, MA USA

Towards the Early Detection of Breast Cancer in Young Women

Oberai, Assad A; Oct 2006; 59 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0763

Report No.(s): AD-A483207; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483207

Although mammography is a valuable screening tool for breast cancer, it is less effective in younger women. Further, cancers in this age group are aggressive, and survival rates are lower. There is need for an effective screening technique to complement clinical and self breast exams. Elasticity Imaging (EI) could assume this role, as it relies on extracting information from ultrasound images which are unaffected by the denseness of the breast. The application of EI to breast cancer detection utilizes the fact that tumors are stiffer than the surrounding tissue, and may be easily discerned in an image of the spatial variation of stiffness. We believe that in order to realize the true diagnostic potential of EI, the linear-elastic model which is typically used, must be replaced by a more realistic non-linear one. Experimental data suggests that this may lead to clearer differentiation of several important tissue types. Our long term goal is to develop and test an ultrasound-based methodology for generating multiple-parameter elasticity images of breast tissue for improved diagnosis and detection of breast cancer in young women. Our aim for this grant is to obtain proof of concept results.

DTIC

Breast; Cancer; Detection; Females; Mammary Glands

20080041102 Vanderbilt Univ., Nashville, TN USA

Manganese Health Research Program (MHRP)

Aschner, Michael; Jan 2008; 162 pp.; In English

Contract(s)/Grant(s): W81XWH-05-1-0239

Report No.(s): AD-A483241; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483241

The Administrative Core includes Dr. Michael Aschner of Vanderbilt University Medical Center as the Principal Investigator (PI), and an Administrative Assistant. The Administrative Core is involved in all facets of the MHRP, ensuring proper allocation of funds to the various Research and Support Cores, required financial reporting to the Army, facilitation of the communication between the various CPIs (Core Principal Investigators), timely reporting of the results, communication with all relevant Department of Defense (DoD) personnel, resolving issues related to conflict of interest, and general coordination between the various Cores. A key early objective of the Administrative Core is to allocate, at the direction of the Steering Committee, remaining funds to additional research projects identified. The Administrative Core is advised by the CPIs of the MHRP. Advice includes issues of scientific merit, oversight of ethical issues associated with animal and human subjects, review of potential additional projects, as well as review of funded projects and progress reports.

DTIC

Health; Manganese; Medical Science

20080041103 California Univ., Los Angeles, CA USA

Molecular Mechanism of Nkx3.1 Deregulation and its Function in Murine Pten Prostate Cancer Model

Jiao, Jing; Sep 2006; 54 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0824

Report No.(s): AD-A483242; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483242

Both PTEN and Nkx3.1 play important role in prostate cancer control. Preliminary results from Pten prostate model indicated that reduced Nkx3.1 expression is correlated with Cre-mediated Pten deletion. The goal of this study is to investigate how these two proteins interplay in prostate cancer development. We demonstrate that restoration of Nkx3.1 into Pten null prostate epithelium can lead to increases cell apoptosis, decreased cell proliferation and prevention of tumor initiation. The anti-tumor effect of Nkx3.1 is correlated with stabilization p53, inhibition Akt activation and AR function. This novel finding was published in Cancer cell. We generated and characterize the primary cell lines from Pten prostate cancer model, which will facilitate us to study the molecular mechanism of hormone refractory prostate cancer.

DTIC

Cancer; Prostate Gland; Rodents

20080041104 Georgetown Univ., Washington, DC USA

Mutagen Sensitivity and DNA Repair Gene Polymorphisms in Hereditary and Sporadic Breast Cancer

Santi-Ruiz, Luisel; May 2007; 133 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0343

Report No.(s): AD-A483244; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483244

Genetic susceptibilities for breast cancer can be elucidated by studying genotype-phenotype correlates. This study investigated women from high risk breast cancer families, a sporadic breast cancer case-control study and associations for specific BRCA1 SNPs and haplotypes, Rad51 SNPs, and deficient DNA repair. The mutagen sensitivity assay, used to measure DNA repair capacity, was used to test associations with genotypes and haplotypes. Positive associations were then tested as predictors of breast cancer risk in a population-based case control study. BRCA1 carriers with breast cancer had more mean breaks per cell (MBPC) than BRCA1 carriers without breast cancer. An association was found for the Rad51 5'UTR 135C allele and MBPC (OR=3.40 95% CI: 1.20-9.90). There also was an increased risk for high MBPC with the BRCA1 D693N allele (OR=6.03 95% CI: 0.69-52.02; p=0.10). There was no association with for the BRCA1 Q356R and E1038G genotypes or haplotypes. The Rad51 5'UTR 135C allele was examined in a population-based case-control study of breast cancer, but no association was found. The results indicated that the Rad51 5'UTR 135C allele and maybe the D693N allele are modifying genotypes for the penetrance of BRCA1 mutation carriers, and so might only be risk factor for high risk families.

DTIC

Breast; Cancer; Deoxyribonucleic Acid; Maintenance; Mammary Glands; Mutagens; Polymorphism; Sensitivity

20080041105 California Univ., San Francisco, CA USA

Molecular Analysis of the Inheritance of Transcriptional Silencing

Chu, Leslie E; Apr 2007; 39 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0416

Report No.(s): AD-A483245; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483245

Silent chromatin domains prevent transcription by packaging DNA into a higher order heterochromatin structure that is inaccessible to the transcriptional machinery. To preserve the transcriptional program in dividing cells, silent and active chromatin domains must be faithfully inherited during chromosome replication and segregation. A failure to propagate set transcriptional programs can drastically change gene expression programs, resulting in a variety of diseases and cancers. In this study, we use the budding yeast, Saccharomyces cerevisiae, to understand how proliferating cells inherit defined chromatin states. We identified, for the first time, two proteins, Sir1 and Asf1, specifically required for the inheritance of transcriptional silencing. We also generated conditional alleles of these inheritance proteins and show that our conditional alleles separate the inheritance process into two fundamental steps: S phase dependent disruption followed by active restoration. These fundamental findings allow us to further dissect and understand the process of epigenetic inheritance, enabling us to devise novel treatments against cancers arising from aberrant gene silencing.

DTIC

Deoxyribonucleic Acid; Genome; Nucleosides; Proteins

20080041106 Johns Hopkins Univ., Baltimore, MD USA
Intra-Operative Dosimetry in Prostate Brachytherapy
Jain, Ameet; Nov 2007; 69 pp.; In English
Contract(s)/Grant(s): W81XWH-06-1-0003
Report No.(s): AD-A483246; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483246

Favorable outcome in prostate brachytherapy critically depends on the accurate placement of radioactive sources in their planned locations. Unfortunately, there is variety of mechanical factors that cause the seeds to divert from their planned locations. While this problem has been known to brachytherapists, current technology does not allow for reliable localization of the implanted sources, thereby prohibiting the prediction and modification of seed distribution intra-operatively. The Research Objective of the proposal is to develop and evaluate ex-vivo a method for intra-operative localization of the implanted seeds in relation to the prostate, to facilitate in-situ dosimetric optimization and exit dosimetry. In particular, we will: [1] Registration of Ultrasound to Fluoroscopy (RUF): Develop methods for reconstruction of seed implants from X-ray fluoroscopy and spatially register them to the prostate anatomy identified in TRUS [2] System Integration: Integrate the above methods in a software package and link it with the FDA-approved CMS Interplant? prostate brachytherapy system to enable in-situ dosimetry calculation [3] Experimental Validation: Evaluate the performance of the RUF system on phantoms and pre-recorded patient data.
DTIC
Cancer; Dosimeters; Prostate Gland

20080041107 New York Hospital-Cornell Medical Center, New York, NY USA
Bioenergetic Approaches and Inflammation of MPTP Toxicity
Beal, M F; Sep 2007; 42 pp.; In English
Contract(s)/Grant(s): W81XWH-04-1-0802
Report No.(s): AD-A483247; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483247

We are continuing to examine a number of neuroprotective agents in an MPTP model of PD. We are also continuing to utilize metabolomic profiling to identify novel biomarkers for PD and to investigate whether these occur in animal models of PD. We are continuing to develop and characterize a new animal model of PD by making a knock out of PINK1, a nuclear encoded kinase localized to mitochondria and which causes autosomal recessive PD. We have completed a study of the effects of human dopaminergic stem cells in a 6-hydroxy dopamine model of PD.
DTIC
Diseases; Toxicity

20080041111 Institute for Cancer Research, Philadelphia, PA USA
Do Deregulated Cas Proteins Induce Genomic Instability in Early-Stage Ovarian Cancer
Golemis, Erica A; Dec 2006; 31 pp.; In English
Contract(s)/Grant(s): W81XWH-06-1-0073
Report No.(s): AD-A483255; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483255

Increased genomic instability arising from centrosomal amplification has been proposed to be an important factor causing development of traits associated with highly malignant ovarian tumors, including multidrug resistance and increased tendency to metastasis. This proposal addresses the hypothesized interaction between the Cas proteins (HEF1 and p130Cas), Aurora A (AurA) and Ajuba as being likely to contribute to genomic instability and metastatic properties of ovarian tumors. In this proposal, we examine tumor samples to determine if Cas expression, activated AurA, and centrosomal amplification are linked, and whether Cas protein upregulation is associated with a poor prognosis (Aim 1). We examine the mechanism by which Cas proteins activate AurA, and determine if drug-mediated inactivation of AurA inhibits Cas promotion of aneuploidy (Aim 2). We use drug and depletion experiments to determine if centrosome amplification and enhanced cellular metastasis are linked, and dependent on Cas/integrin signaling, or whether these are separable properties; and to evaluate combination of AurA- and integrin- directed therapies (Aim 3). In this annual report, we describe significant process on all Aims that validate the hypothesis of critical AurA-HEF1-Ajuba interactions.
DTIC
Cancer; Genome; Ovaries; Proteins

20080041126 Texas Univ., Smithville, TX USA
In Pursuit of Prostate Cancer Stem Cells
Patrawala, Lubna; Jan 2007; 31 pp.; In English
Contract(s)/Grant(s): W81XWH-06-1-0231
Report No.(s): AD-A483285; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483285

Recently, various human tumors have been shown to contain cancer stem cells. These cells, although rare, appear to be the only cells that can regenerate tumor and mediate metastasis. Therefore, these rare cancer stem cells may be the only cells that actually matter to a tumor and to therapeutic interventions. Of great interest, these putative cancer stem cells preferentially express markers that are expressed on normal stem/progenitor cells. Prostate cancer (PCa) stem cells have not been definitively identified. Recently, I identified several populations of PCa stem/progenitor cells with different tumorigenicities and primitiveness in human PCa xenografts and cell lines. In this study, we seek to reevaluate the relevancy of my findings in human PCa samples. At present, we have worked with 25 human PCa samples of varying Gleason grades to set up tumorigenicity assays to test tumorigenic potential of CD133 and CD44-positive cells. Importantly, we have performed our homework in terms of fine-tuning conditions to give us prostatospheres and establish primary xenografts in order to carry out our proposed experiments. Preliminary in vitro experiments indicate that CD133 could mark self-renewing PCa stem-like cells in primary PCa samples. We currently have a number of tumorigenicity experiments in incubation and expect to obtain a readout within the next couple of months. We also expect to begin studies on the invasive and metastatic potentials of the populations sorted for our markers of interest in the near future.
DTIC
Cancer; Prostate Gland; Stem Cells

20080041128 Texas Univ., Houston, TX USA
Identification of Molecular Receptors for Therapeutic Targeting in Prostate Cancer
Mintz, Paul; Dec 2006; 25 pp.; In English
Contract(s)/Grant(s): W81XWH-06-1-0150
Report No.(s): AD-A483288; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483288

Prostate cancer is a difficult disease to treat due to its molecular heterogeneity and diverse clinical outcomes. Current therapies for treating and diagnosing prostate cancer are unsatisfactory, suggesting that new strategies and molecular markers are greatly needed. Tumor cells express specific cell surface receptor complexes for rapid growth and survival. Specific receptor-ligand complexes have profound biological functions such as cell signaling and growth. For example, androgen receptor complex plays a critical role in prostate tumor growth and response to hormone therapy. We propose to identify new receptor-ligand pairs for prostate cancer. We have developed a sophisticated targeting system to probe the tumor vasculature in vivo by phage display technology. We plan to inject phage peptides libraries into prostate tumor-bearing mice to identify specific peptides targeting to the tumor and not to the normal tissues. The tumor-specific peptides will be recovered and analyzed by molecular and biochemical methods. The tumor-specific peptides will be used as a bait to identify and clone the binding receptors by affinity chromatography and biochemical cell fractionation approaches. If we are successful, we will identify new biologically relevant receptor-ligand pairs that may be developed for therapeutic applications for prostate cancer.
DTIC
Biochemistry; Cancer; Peptides; Prostate Gland; Therapy

20080041130 California Univ., San Francisco, CA USA
DNA Damage and Genomic Instability Induced by Inappropriate DNA Re-replication
Green, Brian; Apr 1, 2006; 69 pp.; In English
Contract(s)/Grant(s): W81XWH-04-1-0409
Report No.(s): AD-A483291; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483291

Chromosomal rearrangements and changes in copy number at various genomic loci are hallmarks of cancer cells and may be very early steps in tumorigenesis. The origins of genomic insults are poorly understood and this proposal aims to characterize one potential source of genomic instability, inappropriate DNA re-replication. In a normal eukaryotic cell cycle, the chromosomal DNA of a cell is replicated once, and only once, during S phase to ensure that each daughter cell receives exactly one complement of genomic material. By perturbing the regulation of several proteins involved in replication initiation, our laboratory has been able to conditionally induce varying amounts of re-replication in yeast cells. In the prior

reporting period we demonstrated that re-replication induces a rapid and significant decrease in cell viability and a cellular DNA damage response. Strikingly, we have observed DNA damage in the absence of a classical replication stress response. In this reporting period we have demonstrated that re-replication leads to genome instability, in particular gene duplication. This is the first experimental evidence that re-replication might contribute to gene amplification and thus tumorigenesis.
DTIC
Cancer; Damage; Deoxyribonucleic Acid; Genome

20080041132 Michigan Univ., Ann Arbor, MI USA
Characterization of Neurofibromas of the Skin and Spinal Roots in a Mouse Model
Zhu, Yuan; Feb 2008; 78 pp.; In English
Contract(s)/Grant(s): W81XWH-06-1-0293
Report No.(s): AD-A483297; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483297

Benign neurofibromas and malignant peripheral nerve sheath tumors (MPNSTs) contribute to the majority of morbidity and mortality associated with NF1. The proposed studies will provide significant insight into one of the fundamental questions in neurofibroma biology: whether bi-allelic NF1 inactivation is necessary for neurofibroma formation. The objectives of this proposal are to use a newly established mouse model to (1) identify and characterize neurofibromas that are exclusively or predominantly comprised of NF1+/- cells (designated NF1+/- neurofibromas hereafter) in the skin and spinal roots; and (2) determine whether in this model, neurofibromas in the skin are similar to human dermal neurofibromas and thus are fundamentally different from the plexiform neurofibromas found in spinal roots. Previous studies of human tumors suggest that dermal and plexiform neurofibromas have fundamental differences in their dependence on the NF1 hetereozygous environment and have different malignant transformation potentials. We have made substantial progress in the first two years of the award. For Task 1, we demonstrated that bi-allelic inactivation of Nf1 in neural crest stem cells is required for neurofibroma formation. These results resulted in publication of 3 manuscripts this year (see appendices). For Task 2, we have determined that the Nf1 heterozygous environment promotes neurofibroma progression, but is not required for tumor initiation. We are currently writing a manuscript to publish these results. For Task 3, we have generated the half of the mutant mice proposed for the study. The preliminary data suggest that the NF1 heterozygous environment is not essential for malignant transformation. This year, we will finish characterizing tumor phenotypes of these mutant mice and generate more mutants for analysis.
DTIC
Cells (Biology); Mice; Neoplasms; Spinal Cord; Spine

20080041148 Pittsburgh Univ., Pittsburgh, PA USA
A New Animal Model for Developing a Somatosensory Neural Interface for Prosthetic Limbs
Weber, Douglas J; Feb 12, 2008; 15 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-07-1-0021
Report No.(s): AD-A483345; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483345

During the 12-month funding period, we completed a total of 7 acute experiments, with the goal of developing a technique for using multichannel microstimulation to activate several distinct groups of primary afferent neurons in the dorsal root ganglia (aim 1). The utility of multichannel microstimulation is for the encoding of information in the spatiotemporal patter of stimulation applied to the afferents (aim 2). To the effectiveness of afferent microstimulation, we recorded evoked neural activity in the somatosensory cortex during microstimulation with patterns that varied in 1) amplitude (stimulus current), 2) location (various channels within the DRG electrode array) and 3) rate (the frequency of microstimulation pulses applied to each DRG.
DTIC
Animal Models; Prosthetic Devices; Sensory Perception

20080041150 Lexicon Genetics, Inc., Woodlands, TX USA
Investigation of Murine Models for Sleep, Wakefulness and Target Discovery
Ye, Gui-lan; Lanthorn, Thomas; Savelieva, Katerina; Oct 2007; 74 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-06-1-0434
Report No.(s): AD-A483350; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483350

Genetic inhibition of two genes, an orphan GPCR and a kinase, have been shown to produce changes in the behavior of

mice that suggest the ability to promote sleep and to promote extended wakefulness. One of these is a well-known clock gene, but its effects on normal sleep-wake states had not been characterized. Pharmaceutical investigation of either of these genes appears to be very limited, but could be fruitful in developing compounds to modulate human wakefulness and sleep. The phenotype of a third gene, that had been seen to consistently affect circadian rhythm of activity in early breeding generations, was lost following additional breeding.
DTIC
Circadian Rhythms; Genes; Genetics; Proteins; Rodents; Sleep; Target Recognition; Wakefulness

20080041152 Stanford Univ., Stanford, CA USA
Prostate Dose Escalation by Innovative Inverse Planning-Driven IMRT
Xing, Lei; Nov 2007; 223 pp.; In English
Contract(s)/Grant(s): W81XWH-05-1-0041
Report No.(s): AD-A483354; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483354

The goal of this project is to develop innovative inverse planning techniques for prostate radiation therapy. In the last funding period significant progress has been made toward the goal of the project. In the past funding year, the PI group has contributed greatly to advance prostate radiation therapy techniques. A few important milestones have been achieved toward the goal of the project. These include: (i) Investigated intrafraction prostate motion and its influence on prostate radiation therapy; (ii) Developed method for auto-propagation of contours from planning CT to CBCT for on-line/off-line inverse planning; (iii) Established a novel technique to enhance on-board cone-beam CT and to effectively reduce the radiation dose incurred in the scanning process; (iv) Setup a framework for adaptive inverse planning based on a voxel specific penalty scheme; (v) Evaluated the feasibility of using on-board cone-beam CT for on-treatment dose calculation and developed a reliable electron density mapping algorithm for CBCT-based IMRT optimization; and (vi) Provided a robust procedure for retrospective dose reconstruction in IMRT dose delivery. These works are both timely and important and should have measurable impact on prostate cancer management.
DTIC
Cancer; Dosage; Prostate Gland

20080041163 Nebraska Univ., Omaha, NE USA
Mass Spectrometry to Identify New Biomarkers of Nerve Agent Exposure
Lockridge, Oksana; Apr 2008; 89 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-07-2-0034
Report No.(s): AD-A483399; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483399

Organophosphorus esters (OP) are known to make a covalent bond with the active site serine in the consensus sequence GXSXG of esterases and proteases. However, the site of attachment to proteins that have no active site serine is unknown. Human plasma as well as pure albumin, transferrin, tubulin, and synthetic peptides were treated with soman, sarin, DFP, chlorpyrifos oxon, dichlorvos, and FP-biotin. The site of covalent attachment of OP was determined by fragmentation in the QTRAP mass spectrometer. It was found that OP made a covalent bond with tyrosine in every protein and synthetic peptide tested. The reactive tyrosines were near an arginine or lysine. OP-tyrosine adducts were stable and did not undergo aging. In conclusion, a new OP binding motif has been identified. Recognition of this new OP binding motif may lead to an explanation of noncholinergic effects of OP and of chronic illness from low dose exposure.
DTIC
Biomarkers; Covalent Bonds; Exposure; Mass Spectroscopy; Nerves; Organic Phosphorus Compounds; Tyrosine

20080041164 Harvey Mudd Coll., Claremont, CA USA
Cell Delivery System for Traumatic Brain Injury
Orwin, Elizabeth; Wulur, Isabella; Esclamado, Nicole; Sarvestani, Madineh; Mar 21, 2008; 27 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-06-1-0470
Report No.(s): AD-A483401; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483401

We have met all of the milestones outlined in this grant, except demonstration that the electrospun conduit supports cell

growth. Composite gels are a more promising method for the brain patch therapy due to greater degree of control over shape of the three-dimensional structure, therefore the majority of our efforts have been focused on gel development. In addition to the work outlined in the original proposal, we have also determined a method for assessing diffusion of growth factors out of our gel matrices. Characterization of the release kinetics of neural-specific growth factors from gel matrices will help to inform the design of an appropriate growth-factor laden matrix for the cell delivery system.
DTIC
Brain; Brain Damage; Injuries

20080041165 Pittsburgh Univ., Pittsburgh, PA USA
Role of Hsp90 in Androgen-Refractory Prostate Cancer
Wang, Zhou; Mar 2008; 8 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-07-1-0147
Report No.(s): AD-A483403; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483403

A major challenge in prostate cancer research is to develop novel therapies that can delay or prevent the progression of androgen-sensitive prostate cancer to androgen-independence. Androgen receptor (AR) is often overexpressed and plays an essential role in androgen-refractory prostate tumors. Our preliminary studies suggest that heat shock protein 90 (Hsp90) is required for androgen-independent AR nuclear localization in androgen-refractory prostate cancer cells. This project will test our research hypothesis that Hsp90 plays a critical role in ligand-independent AR nuclear localization, an essential step leading to androgen-refractory prostate cancer. In the last year of the funding period, we have constructed lenti-viral vectors for expressing siRNA specific for Hsp90. Experiments are on the way to test if downregulation of Hsp90 protein will cause alterations in AR intracellular localization and function in prostate cancer cells.
DTIC
Cancer; Hormones; Males; Prostate Gland; Refractories

20080041170 Army Medical Research Inst. of Infectious Diseases, Fort Detrick, MD USA
Fluorometric Assay to Detect the Germination of Bacillus Anthracis Spores and the Germination Inhibitory Effects of Antibodies
Welkos, Susan L; Rea, Kelly M; Lee, John S; Gibbs, Paul H; Little, Stephen F; Jul 1, 2003; 12 pp.; In English
Report No.(s): AD-A483426; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483426

A sensitive assay for germination of spores of the anthrax agent was developed using a fluorescence reader. Significant inhibition of germination was detected for spores initially treated with antispore or antitoxin antibodies. Antigens specific to ungerminated spores that stimulate potentially protective antibodies are being identified and their role in inhibition of germination and in immune protection against anthrax will be determined. The germination of spores of Bacillus anthracis is typically detected by alterations in spore refractility, stainability, and absorbance (OD560). We have developed a more quantitative, semi-automated procedure for detecting germination by using a microtiter kinetic reader for fluorescence spectrophotometry (Biotek FL600). The procedure was based on the increase in fluorescence of spores with time during their incubation in germination medium containing Syto-9, a fluorescent nucleic acidbinding dye which stained germinated B. anthracis but not dormant spores. A colorless, defined medium containing equal parts of L-alanine, adenosine, and casamino acids provided low levels of background fluorescence, stimulated germination, and yielded reasonable germination kinetics. Antibodies (Abs) to the protective antigen (PA) component of the anthrax toxins of B. anthracis have been shown to inhibit in vitro germination. Regression analyses of the germination data obtained with the reader yielded parameters (i.e., the difference between the baseline and maximal fluorescence values [a coefficient] and the area under the curve) that gave significant differences between spores pretreated with anti-PA or antispore antibodies and buffer or nonimmune sera. We are testing sera from vaccinated or passively-immunized animals to determine the correlation between serum germination inhibitory activity, titers of serum anti-PA or antispore antibodies, and survival after lethal challenge.
DTIC
Antibodies; Assaying; Bacillus; Fluorescence; Germination; Infectious Diseases; Spores

20080041177 Maryland Univ., College Park, MD USA

Representation of Dynamic Broadband Spectra in Auditory Cortex

Shamma, S A; Depireux, D A; Klein, D J; Simon, J Z; Jan 1998; 18 pp.; In English

Report No.(s): AD-A483457; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483457

In Primary Auditory Cortex (AI) of Ferrets, we have previously characterized cells responses to dynamic broad-band sounds. We found best responses to temporal modulations from 4 to 16 Hz, and spectral modulations from 0.4 to 1.6 cycles/octave in the stimulus's spectro-temporal envelope. The Spectro-Temporal Response Field (STRF) explains the linear component of the response to the spectro-temporal envelope of a broad-band sound. The STRF is often a good predictor of the response to an arbitrary sound. However, previous measurements of the STRF using sinusoidal spectro-temporal envelopes were hampered by the time required to accumulate data from a cell. We use sums of spectro-temporal sinusoids as stimuli: these reduce recording time; confirm quadrant spectro-temporal separability; and can be used to explore non-linearities.

DTIC

Broadband; Spectra

20080041178 Wisconsin Univ., Madison, WI USA

Structural and Functional Analysis of CA125: Potential for Early Diagnosis and Understanding the Immune Evasion Strategies of Epithelial Ovarian Tumors

Patankar, Manish S; Jul 1, 2006; 27 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0102

Report No.(s): AD-A483461; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483461

The proposed studies will define the structure and the biological function of the epithelial ovarian tumor marker MUC16 (CA125). The knowledge obtained can be utilized to develop better diagnostic tests for early detection of ovarian cancer and also to understand the pathogenesis of this disease. Due to delays in procuring the appropriate approvals from the Institutional Review Boards we have not been able to initiate the proposed studies. Research on MUC16 in the PI's laboratory has continued, however, through the use of start-up funds provided by the University of Wisconsin-Madison. This research has led to a very in-depth understanding of the MUC16 molecule and its physiological relevance. The impact of this understanding on the proposed studies will be significant. Here, we briefly discuss the highlights of this research effort.

DTIC

Cancer; Diagnosis; Functional Analysis; Ovaries; Structural Analysis; Tumors

20080041233 Michigan Univ., Ann Arbor, MI USA

CHD8, A Novel Beta-Catenin Associated Chromatin Remodeling Enzyme, Regulates Androgen Receptor Mediated Gene Transcription

Bochar, Daniel A; Mar 2008; 7 pp.; In English

Contract(s)/Grant(s): W81XWH-07-1-0224

Report No.(s): AD-A483410; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The activity of the androgen receptor (AR) is critical for normal prostate development and function, but AR activity also plays a major role in the development and progression of prostate cancer. To better understand the function of beta-catenin in AR mediated transcription, we have identified a novel chromatin remodeling enzyme, CHD8, that can associate with beta-catenin and functions in AR mediated gene transcription. Year 1 was focused on the first specific aim of this proposal; the interaction of CHD8 with beta-catenin and the androgen receptor. Experiments were performed to characterize this interaction in vitro using recombinant proteins, and reagents were made to characterize this interaction in vivo using chromatin immunoprecipitation techniques. This work is required for the study of the function of CHD8 and beta-catenin in AR mediated transcription and the ultimate understanding of the role played by CHD8 in prostate cancer progression.

DTIC

Cancer; Chromatin; Enzymes; Hormones; Males; Prostate Gland; Proteins

20080041234 Roswell Park Memorial Inst., Buffalo, NY USA

Examination of the Role of DNA Methylation Changes in Prostate Cancer Using the Transgenic Adenocarcinoma of Mouse Prostate (TRAMP) Model

Morey, Shannon R; Mar 2008; 63 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-07-1-0153

Report No.(s): AD-A483413; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The TRansgenic Adenocarcinoma of Mouse Prostate (TRAMP) model provides an excellent system to study disruption of the DNA methylation process in prostate cancer. To date, several key conclusions can be made from this research. First, analysis of methylation patterns in TRAMP revealed a small number of hypermethylation events in early stage lesions, with a great increase in late stage tumors. Furthermore, late stage tumors, androgen independent tumors and metastases each display numerous and tumor type specific hypermethylation events. Secondly, a large proportion of these hypermethylated genes, including p19/ARF and p16INK4a, display downstream hypermethylation correlating with robust overexpression. In addition, p16 and p19 overexpression, but not downstream hypermethylation, occurs in early stage prostatic lesions in TRAMP, suggesting that overexpression may be the initiating event and pharmacological reversal of downstream hypermethylation in TRAMP cell lines led to decreased expression of p19 and p16, indicating that downstream hypermethylation contributes to the maintenance of increased gene expression. Overall these data indicate that locus specific hypermethylation is selected for upon tumor progression and treatment with hypomethylating agents may inactivate oncogenes whose expression is maintained by downstream hypermethylation.

DTIC

Cancer; Deoxyribonucleic Acid; Methylation; Mice; Prostate Gland

20080041243 Medical Univ. of South Carolina, Charleston, SC USA

Hyaluronic Acid is Overexpressed in Fibrotic Lung Tissue and Promotes Collagen Expression

Gooz, Pal; Apr 2008; 7 pp.; In English

Contract(s)/Grant(s): W81XWH-07-1-0253

Report No.(s): AD-A483446; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In 30 to 70% of systemic sclerosis patients, the disease progresses to the lungs and internal organs. This lung fibrosis (i.e. the overexpression of collagen) is the major cause of morbidity and mortality in scleroderma. The overexpression of collagen is accompanied by the overexpression of other extracellular matrix molecules including hyaluronic acid (HA). To evaluate the possibility that HA regulates collagen expression, we treated lung fibroblasts with HA oligomers (fragments of HA that block HA binding to its cell surface receptors CD44, TLR2, and TLR4). Both HA oligomers and lipopolysaccharide (LPS, another TLR2 and TLR4 ligand) had major effects on collagen expression. In addition, HA oligomers affected the expression of the collagen-degrading enzyme MMP-2. These observations open up the possibility that reagents that affect signaling cascades initiated by HA or LPS will have therapeutic value in inhibiting the progression of lung fibrosis in human patients.

DTIC

Collagens; Fibrosis; Lungs

20080041253 Baylor Coll. of Medicine, Houston, TX USA

Attenuated Transforming Growth Factor Beta Signaling as a Therapeutic for Prostate Cancer Progression

Yang, Feng; Apr 2008; 21 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-07-1-0200

Report No.(s): AD-A483469; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The purpose or this proposal is to determine the effects of stromal TGF-beta signaling inhibition by SD-208 (a TbetaRI-specific inhibitor) on prostate cancer growth, by using both in vitro prostate cancer/stromal cell co-culture model and in vivo xenograft model. In this initial funding year, we have tested the SD-208 efficiency in inhibiting TGF-beta signaling in prostate stromal cells. We further demonstrated that TOF-beta signaling in prostate stromal cells induced a complex response in prostate cancer cells. This response can be inhibited by either knockout of TbetaRII from mouse prostate stromal cells or by addition for SD-208 into the co-culture for human prostate cancer cells and human prostate stromal cells. We are using cDNA microarray and qPCR to identify the potential signaling molecules regulating these events. Based on these in vitro results, we are now carrying out the in vivo studies. We expect to finish all these studies at the conclusion for this award and present these sets for data in the final report.

DTIC

Cancer; Inhibitors; Prostate Gland; Therapy

20080041266 Louisiana State Univ., New Orleans, LA USA

Targeted Eradication of Prostate Cancer Mediated by Engineered Mesenchymal Stem Cell

Cui, Yan; Apr 2008; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0869

Report No.(s): AD-A483502; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Prostate cancer is the second leading cause of cancer death among men in North America. Our long-range goal is to develop an innovative non-invasive approach to reach those metastatic prostate cancer cells via tumor interacting stroma cells and eliminate them on-site through cytotoxic gene delivery. This is achieved by using engineered mesenchymal stem cells (MSC) as a gene delivery vehicle to reach tumor cells as they tend to serve as stroma bed for tumor growth. For the past year, significant progress has been made. We presented our research finding during the IMPaCT meeting in Atlanta in September. Briefly, we have re-established all the necessary resources for this project, including re-construction of therapeutic gene delivery vectors, engineering human MSC and LNCap tumor. We demonstrated in the SCID mice model that engineered MSC can support the establishment and growth of human prostate cancer cells subcutaneously and intra-tibialy. More importantly, those MSC engineered to express a suicidal gene HSV-TK can be used to reduce tumor growth upon administrating pro-drug. On the other hand, human MSC engineered to express a non-toxic reporter gene GFP after were unable to halt the tumor growth. These results will be presented in an international cancer conference (Cancer Congress 2008), as well as published as a scientific paper in scientific journal, which is under preparation.

DTIC

Cancer; Prostate Gland; Stem Cells

20080041274 Walter Reed Army Inst. of Research, Silver Spring, MD USA

Characterization of Mustard-Stimulated Protease by Zymography

Jin, Xiannu; Li, Zhuangwu; Leng, Yen; Ray, Prabhati; Ray, Radharaman; Rosenthal, Dean; Rosenthal, Cynthia; Jul 1, 2003; 4 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483522; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Protease stimulation in human epidermal keratinocytes (HEK) due to mustard exposure is well established. However, the specific protease(s) stimulated by mustard remain to be determined. We used zymography technique to characterize the mustard-stimulated protease in HEK extracts. The major proteolytic band in 70kDa molecular weight was observed in mustard-exposed cells. Addition of a serine protease inhibitor (ICD 2812) or EGTA decreased this band. The protease from mustard treated HEK was electro eluted from the zymogram gel and was found to hydrolyze the synthetic substrate Chromozyme TRY, supporting that it could be a calcium dependent serine-protease.

DTIC

Enzymes; Peptides; Protease

20080041286 Army Soldier and Biological Chemical Command, Aberdeen Proving Ground, MD USA

Nuclear Magnetic Resonance Studies of Cannabinoid Receptor Site Peptides

Bevilacqua, Vicky L; Brown, John H; Rice, Jeffrey S; Hutchings, Anna M; Albright, Travis P; Hurst, Dow P; Reggio, Patricia H; Jul 1, 2003; 8 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483562; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Recent mutagenesis and chimera studies have implicated the second extracellular loops (E2) of CB1 and CB2 in ligand binding. As a contribution toward understanding the role of E2 in the interactions of CB1 and CB2 with cannabinoids, we have initiated structure studies on two E2 peptide analogues in the absence and presence of SDS using nuclear magnetic resonance (NMR) spectroscopy. Based on alpha proton chemical shifts, CB2-E2 and CB1-E2 have random coil conformations in an aqueous environment. The N-terminal half (residues E1-S8) of CB1-E2 in SDS micelles contains an alpha-helical stretch. CB2-E2 in the presence of SDS consists of at least two equally populated stable conformations, each having alpha proton chemical shifts consistent with random coil conformations. Preliminary simulated annealing calculations suggest that the E2 peptides in both the absence and presence of SDS contain a well-defined region that includes the CSXXXP sequence shared by the cannabinoid receptors and several orphan receptors. The precise conformation of the CSXXXP region depends on the peptide and the solvent system.

DTIC

Nuclear Magnetic Resonance; Peptides

20080041287 Army Research Inst. of Environmental Medicine, Natick, MA USA

The Utility of the Isobalance Force Platform in the Assessment of Balance: Mechanical and Human Subjects Testing

Lester, M E; Seay, J F; Antczak, A J; Evans, R K; Zambraski, E J; Nindl, B C; Jun 2008; 68 pp.; In English

Report No.(s): AD-A483563; TO8-09; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Medically expedient and evidence-based examination metrics that can be employed in a combat setting are needed to assist clinicians in identifying and classifying Soldiers who may have sustained mild Traumatic Brain Injury (mTBI). MRMC agreed to test the IsoBalance device for REF as an instrument to measure postural sway parameters potentially related to an TBI. USARIEM conducted mechanical tests in the laboratory as well as human standing balance tests to assess device utility precision, and accuracy. Data were collected on over 500 healthy soldiers at Ft. Jackson, SC during January 2008 using a standard battery of standing balance tests for comparison to results from the open literature. Over 90% of the data completed were affected but an unexplained signal deviation (artifact) that had a profound effect on the results. Results not affected by artifact were plagued with issues of low data resolution and high variability when compared to similar results reported in the literature. Based on the results of the mechanical and human balance data presented in this report, and a separate letter of warning from the FDA (Appendix C), fielding of the IsoBalance system to assess postural sway in the classification of mTBI is not recommended at this time.

DTIC

Brain Damage; Classifications; Human Beings; Injuries; Military Personnel

20080041288 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Nano-Mechanical Properties of Heat Inactivated Bacillus anthracis and Bacillus thuringiensis Spores

Poindexter, Jessica L; Mar 2008; 85 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483566; AFIT/GAP/ENP/08-M07; No Copyright; Avail.: Defense Technical Information Center (DTIC)

B. thuringiensis spores must have similar properties to B. anthracis spores to be a good simulant in counter-proliferation studies. In particular, they must behave in a similar way when exposed to high temperatures for short periods of time as would be caused by an explosion. This research project compares surface elasticities for four different spore sample types, B. anthracis spores, heat inactivated B. anthracis spores, B. thuringiensis spores, and heat inactivated B. thuringiensis spores. Heat inactivated spores were exposed to a temperature just high enough that no spores were observed to germinate. Elasticity values for the spore surfaces were determined by measuring the reflection and transmission of acoustic waves between a spore surface and an atomic force microscope (AFM) tip, assuming a Hertz contact model. B. thuringiensis spores had a higher and more variable elasticity then B. anthracis spores. Heat inactivation caused spore surface elasticity to decrease. Calculated average elasticities were 3.73 GPa for B. anthracis, 2.73 GPa for heat inactivated B. anthracis, 4.67 GPa for B. thuringiensis, and 3.57 GPa for heat inactivated B. thuringiensis.

DTIC

Bacillus; Elastic Properties; Mechanical Properties; Spores

20080041303 Alabama Univ., Birmingham, AL USA

Chemoprevention Against Breast Cancer with Genistein and Resveratrol

Whitsett, Timothy G; Mar 2008; 47 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0308

Report No.(s): AD-A483601; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Breast cancer remains a destructive disease despite new therapeutics. It is well accepted that environmental factors can play an important role in determining one's future risk of the disease. We believe that two natural polyphenols, genistein (a component of soy) and resveratrol (a component of grapes and red wine), can suppress mammary carcinogenesis. We and others have clearly shown mammary-protective effects against chemically-induced cancer. This project aimed to elucidate mechanisms through which these polyphenols may exert their effects. We show that genistein and resveratrol modulate the gene and protein expression of several critical players in the mammary gland involved in growth and proliferation. We see changes in MAPK signaling pathway, the PI3K/Akt pathway, apoptotic cascade, beta casein, as well as changes in sex steroid receptor co-activators. We have demonstrated that the estrogen receptors play an important role in the mechanisms of genistein and resveratrol. These data will add to the pre-clinical data necessary to forward further work with these polyphenols towards the prevention of breast cancer.

DTIC

Breast; Cancer; Mammary Glands; Prevention

20080041304 Lankenau Inst. of Medical Research, Wynnewood, PA USA

Development of a Novel Therapeutic Paradigm Utilizing a Mammary Gland-Targeted, Bin-1 Knockout Mouse Model

Muller, Alexander; Mar 2008; 74 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0279

Report No.(s): AD-A483602; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Evidence of loss or attenuation of the Bin-1 gene in human breast cancers has implicated Bin-1 as a tumor suppressor or negative modifier gene in mammary gland epithelial cells. We have discovered that Bin-1 loss can promote tumorigenesis through an immune escape mechanism and that this correlated with the negative regulatory impact that we showed Bin-1 can exert on the important immunomodulatory enzyme indoleamine 2,3-dioxygenase (IDO). Previously we have demonstrated that, in combination with certain chemotherapeutic agents, inhibitors of IDO can be employed in a non-obvious therapeutic regimen to successfully treat pre-established, autochthonous breast tumors in MMTV-Neu transgenic mice. During this reporting period, we have obtained direct evidence in the MMTV-Neu model that, in the context of breast cancer, IDO activity in plasmacytoid dendritic cells from the tumor draining lymph nodes may be more relevant than in the tumor cells themselves. Furthermore, we have found that 1-methyl-D-tryptophan (D-1MT), the presumptive IDO inhibitor which is in early phase clinical trials may instead be directly targeting IDO2, a related enzyme that we discovered. Our data argue that genetic evaluation of patients for known IDO2 polymorphisms may be critically important to interpreting trial outcomes with D-1MT. DTIC

Breast; Cancer; Chemotherapy; Drugs; Knockout Mice; Mammary Glands; Therapy

20080041315 Office of the Surgeon General, Falls Church, VA USA

Rehabilitating the Wounded: Historical Perspective on Army Policy

Marble, Sanders; Jun 2008; 121 pp.; In English

Report No.(s): AD-A483626; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This study looks at how the Army has handled long-term care for combat casualties. Policy and practice have changed over time due to 1) the availability and capability of other government hospitals to care for patients, 2) changing political climates, 3) expanding GME programs that need complex patients, 4) the developments of medical science, and 5) the economics of medical practice. The AMEDD has different levels of care and rehabilitation for different patient populations, including varying levels for combat casualties. As the AMEDD looks at its structure of personnel and facilities for the future, it should consider the experience of the past. Doing nothing for the wounded is not an option, doing everything for the wounded is not practical, so the question for contemplation and debate is how much should be done and by whom. DTIC

Casualties; Histories; Medical Services; Military Operations; Policies

20080041320 Naval Postgraduate School, Monterey, CA USA

Analyzing the Effects of Human Performance Under Stress

Ammons-Moreno, Daniel B; Pauls, Kathleen E; Jun 2008; 83 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483641; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In order to analyze the effects of stress on human performance, we examined baseball players because of the large body of data and many measures of performance available. Clutch hitting is examined because a baseball player batting in a clutch situation is analogous to a person who is performing in a stressful situation. The more important, or clutch, the situation the more stress the player may feel. Statistical measures were used to determine if a player is able to perform better than his average ability in situations defined as clutch. Three different clutch definitions were used to examine eight consecutive years of baseball data. Major League Baseball (MLB) data showed an overall clutch effect; this was corrected for with a parameter, alpha, is specific to the definition of clutch. Once each player's nonclutch average minus the clutch average is corrected for with alpha, the chi-squared test is used to examine those differences. This analysis is also performed on the quartile values for batters who were ranked according to their difference, corrected by alpha. There is no evidence to support the claim that there are certain batters who perform better in clutch situations (compared to their own performance in non-clutch situations) than other batters. DTIC

Human Performance

20080041321 Naval Postgraduate School, Monterey, CA USA

Application of a Genetic Algorithm and Multi Agent System to Explore Emergent Patterns of Social Rationality and a Distress-Based Model for Deceit in the Workplace

Davis, Jacob F; Jun 2008; 125 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483642; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Organizations rely on the honest operation of its members, but in an environment where individual members cannot be observed the opportunity for individuals to lie can lead to dishonest choices (Grover, 1993). This thesis created and applied a computer-based Genetic Algorithm and Multi Agent System in order to test the predictions of Dr. Steven Grover's distress-based model of the antecedents of lying in organizations. Grover's model blends self-interest theories and uses role theory to identify potential antecedents to lying. The created system provided agents that encountered situations of distress such as those described by Grover's model. The agents actions were then observed and compared to Grover's hypothesis that an individual's skill will be inversely proportional to his frequency of lying. Social rationality has been shown to emerge in simple self-interested agents. A hypothesis that in an environment where an organization and its members are independently self-interested, the frequency of organization members lying will be inversely proportional to the magnitude of feedback provided to the organization was tested. The results support both Grover's hypothesis and the hypothesis on social rationality. Self-interest individuals with higher skills lied less than individuals with lower skills. Also, self-interested individuals lied less in the presence of a higher magnitude of negative organizational feedback.

DTIC

Algorithms; Genetic Algorithms; Genetics

20080041323 Boston VA Research Inst., Inc., MA USA

Autologous Marrow-Derived Stem Cell-Seeded Gene-Supplemented Collagen Scaffolds for Spinal Cord Regeneration as a Treatment for Paralysis

Spector, Myron; Jan 2008; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0129

Report No.(s): AD-A483644; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The long-term objective of this research is to develop a device for treating spinal cord injury. The specific aims of the proposed study are to test new types of collagen biomaterials. Moreover we will be investigating the effects of incorporating genes from nerve growth factors into the collagen scaffolds and seeding the scaffolds with neurogenic cells. The standardized defect site is a 5-mm gap in the rat thoracic spinal cord. Our principal method of evaluation is histomorphometry. During the past project year the following were accomplished, toward achieving the objectives of determining the effects of selected design variables on the reparative processes in spinal cord defects: 1) investigation of nanoparticles, as carriers of genes for neurotrophic factors, to be incorporated into collagen scaffolds for implantation into spinal cord defects; 2) development of an injectable collagen formulation as a carrier for plasmid DNA encoding for neurotrophic factors; 3) formulation of collagen scaffolds containing hyaluronic acid; and 4) investigation of the conditions in vitro for the neuro-differentiation of neural stem cells.

DTIC

Bone Marrow; Collagens; Paralysis; Spinal Cord; Stem Cells

20080041345 Kansas Univ., Kansas City, KS USA

Inhibition of Androgen-Independent Growth of Prostate Cancer by siRNA- Mediated Androgen Receptor Gene Silencing

Li, Benyi; Feb 2008; 102 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0214

Report No.(s): AD-A483723; No Copyright; Avail.: Defense Technical Information Center (DTIC)

To determine if AR gene silencing in prostate cancer cells via RNA interference mechanism leads to disruption of androgen-independent progression. We generated a recombinant AAV for long-term expression of a hairpin-structured AR siRNA in vivo. Then we determined the essential role of the androgen receptor in androgen-independent growth of prostate cancer. We demonstrated that knocking down AR expression abolished tumor growth and blocked androgen-independent transition in LNCaP and LAPC-4 cell-derived xenografts. In addition, we observed that AR silencing resulted in a significant decrease of androgen-independent tumor growth in C4-2 cell-derived xenografts in castrated mice. We also demonstrated that knocking down AR expression by systemic delivery of the AAV particle eradicated CWR22RV1 androgen-independent xenograft tumors but not AR-null PC-3 xenograft tumors. We analyzed the mechanisms for AR siRNA-induced cell death and

identified the anti-apoptotic proteins SGK1 and Bcl-xL, as the downstream effecters of AR-mediated survival pathway. Most of these results were published (Appendix II-VI).
DTIC
Cancer; Hormones; Males; Prostate Gland

20080041346 California Univ., Los Angeles, CA USA
Identification of Human Prostate Cancer Stem Cells by Creation and Characterization of Prostaspheres
Garraway, Isla; Apr 2008; 39 pp.; In English
Contract(s)/Grant(s): W81XWH-07-2-0030
Report No.(s): AD-A483725; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Stem cells (SCs) are present in specialized niches within tissues and enable long-term organ function by replacing dying cells over time. SCs have the unique capability for self-renewal and can be stimulated to transform into different cell types within the organ. Since SCs are genetically coded to live longer than other cells and resist mechanisms that would normally induce cell death, they may be especially susceptible to carcinogenic changes. Recent evidence suggests that cancer stem cells (CSCs) exist and are responsible for cancer propagation, despite representing the minority of cells within tumors. Consequently, the development of drugs that target CSCs may result in better clinical outcomes. As a first step, identifying CSCs in solid tumors must occur. Early studies to identify SCs within normal prostate and prostate cancers are promising, but limited by the difficulty of cultivating these rare cells. Development of the prostasphere assay, using cells derived from human tissue specimens, may enable in-depth characterization of prostate stem cells. Prostaspheres are globes of stem and early progenitor cells that can be induced to grow in culture. The prostasphere assay may enable enrichment of SCs from normal and cancerous specimens for further characterization, with the long-term goal of defining new therapeutic targets within this population.
DTIC
Cancer; Prostate Gland; Stem Cells

20080041347 Colorado Univ., Aurora, CO USA
Alternate Splicing of CD44 Messenger RNA in Prostate Cancer Growth
Iczkowski, Kenneth A; Apr 2008; 45 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-07-1-0300
Report No.(s): AD-A483727; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Loss of CD44 standard and increased splice variant form CD44v7-10 facilitate prostate cancer (PC) invasion. Mitogen-activated protein kinase (MAPK) pathways and paracrine calcitonin may dysregulate CD44. CD44 total and CD44v7-10 RNA or protein were assessed in androgen-independent PC with known high CD44v7-10 expression and in BPH-1 cells in response to exogenous calcitonin and to inhibitors of protein kinase A, MEK, JNK, or p38 kinase. Inhibition of MEK or p38 but not JNK reduced CD44 RNA in cancer and benign cells. Calcitonin, in calcitonin receptor-positive cells only, caused suppression of CD44 total but increase in variant, the latter apparently dependent on the p38 pathway. See the attached, submitted manuscript. Aim 2: In vivo trials of altering CD44 in mouse xenografts. We spent several months cloning our DNA sequences for CD44 standard overexpression and CD44 variant RNAi out of pTracer and into pAAV-IRES-GFP to use the latter plasmid to establish therapeutic adenoassociated virus (AAV). However, when C4-2 prostate cancer cells were infected, only 30% were GFP+ infected cells, and the low percent of viable cells, due to viral cytopathic effect, prohibited in vitro or in vivo use of AAV. We decided to revert to the pTracer approach with blasticidin cell selection. Matrigel invasion assay demonstrates that non-invaded cells have much higher GFP+ than invaded ones and by western blot analysis, non-invasion correlates with altered CD44 standard and variant.
DTIC
Cancer; Prostate Gland; Ribonucleic Acids; Splicing

20080041348 Army Research Inst. of Environmental Medicine, Natick, MA USA
Comparison of USARIEM Heat Strain Decision Aid to Mobile Decision Aid and Standard Army Guidelines for Warm Weather Training
Blanchard, Laurie; Santee, William; Jun 2008; 48 pp.; In English
Report No.(s): AD-A483728; USARIEM-TR-T08-07; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Despite the US Army's comprehensive heat injury prevention program and widespread use and acceptance of guidance based on the wet bulb globe temperature index (WBGT), there were 5246 reported heat casualties in US Army Soldiers from

1980-2002. Of those, 75% occurred during scheduled military training at sites that followed WBGT based doctrine. There is a clear need for new methods to reduce the likelihood of heat casualties during military training. This report provides the basis for the following conclusions: (1) Since weather varies in time and space, best guidance will be obtained when model inputs are real-time weather measurements in the area of concern rather than estimated values. (2) The USARIEM heat strain decision aid (HSDA) is likely to be a more effective tool for reducing the risk of heat injury than simplifications derived from HSDA such as decision aids which use categorical weather input and the existing WBGT based Flag guidance (colored flag denotes WBGT heat category and associated heat injury prevention measures), and (3) Analysis of outcomes over a wide range of conditions should be used to further improve the performance of automated planning tools for warm weather training and these tools should be provided to Soldiers and their leaders.
DTIC
Decision Support Systems; Education; Risk

20080041349 Manitoba Univ., Winnipeg, Manitoba Canada
Characterization of Steroid Receptor RNA Activator Protein Function in Modulating the Estrogen Signaling Pathway
Yan, Yi; Mar 2008; 144 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-05-1-0245
Report No.(s): AD-A483730; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The bi-faceted products of the Steroid receptor RNA activator gene (SRA1) consist of a functional RNA, which acts as a transcriptional co-activator and a protein (SRAP), that is conserved in chordates and which function remains elusive. Regarding the functional role of SRAP, we had determined through protein arrays that SRAP is able to interact with various transcription factors. Furthermore, we have established that SRAP is associated to chromatin in MCF-7 cells. We also examined the possible effect of SRAP recruitment on transcription using the potent GAL4-VP16 hybrid transcription activation system. We observed that SRA possesses a transcriptional repressive activity capable of inhibiting the GAL4-VP16 transcription activity. This SRAP transcriptional repressive potential is sensitive to trichostatin A (a HDAC inhibitor) treatment. In addition, SRAP is able to co-immunoprecipitate HDAC activity. Meanwhile, using splice-switching-oligonucleotides and real-time PCR, we observed that increasing the balance between non-coding SRA to coding-SRA led to an increase in ER-beta expression in T5 breast tumor cells. Further experiments confirm that it is SRAP rather than SRA integrates ER-beta expression. Finally, we found SRAP differentially regulates unbound and agonist/antagonist bound estrogen receptor alpha activity in an estrogen responsive elementdependent manner.
DTIC
Activation; Estrogens; Modulation; Proteins; Ribonucleic Acids; Steroids

20080041350 Iowa Univ., Iowa City, IA USA
PSMA-Targeted Polygadolinium Clusters: A Novel Agent for Imaging Prostate Cancer
Messerle, Louis; Jan 2008; 25 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-06-1-0155
Report No.(s): AD-A483731; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Controlled hydrolysis of lanthanide element or yttrium salts in the presence of amino acids yields a series of polynuclear clusters with two four twelve fourteen and fifteen lanthanide or yttrium centers bridged by hydroxides and possessing chelating amino acids. The MRI relaxivity of the gadolinium (Gd) clusters has been studied in vitro with an unprecedented large pH-dependent value of 165 mM-1 s-1 for the Gd14 cluster. We have crystallized dysprosium (Dy) analogs of the dinuclear and tetranuclear clusters for neutron diffraction analysis in order to determine the dysprosium...hydrogen (hydroxide) distance. Yttrium analogs have been prepared structurally characterized and studied by yttrium-89 NMR spectroscopy in order to determine solution structures. The first attempt at preparing a Y15 cluster gave in the presence of residual carbonate an unprecedented Y60 polyhedral cluster that suggest routes to larger Gd clusters. Europium (Eu) cluster analogs have been prepared and their reduction explored in order to exploit the Eu(ll)-Eu(lll) redox couple and develop a redox-sensitive MRl reporter for reactive oxygen species in tumors. A potentially multinuclear chelating ligand with amino acid serine moieties at each end has been prepared by multi-step organic synthesis for ditopic coordination of the Gd14 cluster.
DTIC
Cancer; Imaging Techniques; Prostate Gland

20080041359 International Society for Optical Engineering, Bellingham, WA USA
European Conferences on Biomedical Optics. Held in Munich, Germany on 17-21 June 2007
Arthurs, Eugene; Gorsuch, Marilyn; May 8, 2008; 45 pp.; In English
Contract(s)/Grant(s): FA9550-07-1-0479
Report No.(s): AD-A483765; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ECBO 2007 was the most successful event held to date. There were a total of 537 attendees from around the world. Job functions ranged from R&D: applied research, basic research, product development; to engineering and design, student, and educator. Subjects explored in depth included molecular imaging, optical coherence tomography, diagnostic optical spectroscopy, diffuse optical imaging, confocal, multiphoton, and nonlinear microscopic imaging, novel optical instrumentation, therapeutic laser applications, and bio-photonics in life sciences. ECBO attendees by geographic area: 75.6% Europe; 10.1% North America; 11.4% Asia; 2.9% Rest of the World. Manuscripts were produced by authors for distribution in the world literature.

DTIC

Biomedical Data; Conferences; Germany; Medical Science; Photonics

20080041360 California Univ., Davis, CA USA
International Congress on Biophotonics (1st) (ICOB 2008). Held in Sacramento, California on February 3-7, 2008
Albala, Joanna; Jun 2, 2008; 4 pp.; In English
Contract(s)/Grant(s): FA9550-08-1-0030
Report No.(s): AD-A483767; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The NSF Center for Biophotonics Science & Technology (CBST) of UC Davis hosted the 1st International Congress on Biophotonics (ICOB) on February 3 7, 2008 in Sacramento, California. The purpose of the meeting was to gather thought leaders from around the world, representing academia (researchers and educators), industry, medicine, and government agencies to create a strategic roadmap for the future of biophotonics research, technology development and education. The rationale for the meeting was the need for a strategic roadmap to provide guidance and direction to further biophotonic science and technology development into those areas of greatest need for creative and innovative solutions to grand challenges in the life sciences and medicine. ICOB was also a venue to present and expand upon www.BioPhotonicsWorld.org , a web based portal to serve as a virtual community for all biophotonics stakeholders , that was developed and launched in September 2007 by CBST and the Canadian Institute for Photonic Innovations, (CIPI)

DTIC

Biomedical Data; Medical Science; Photonics

20080041365 NLight Photonics Corp., Vancouver, WA USA
Photochemical Tissue Bonding for Military Medical Applications
McCal, Dennis; Prahl, Scott; Jun 30, 2008; 22 pp.; In English
Contract(s)/Grant(s): FA9550-07-C-0098
Report No.(s): AD-A483796; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Report developed under STTR contract for topic number AF07-T033. The overall goal is to develop a complete system for micro-anastomosis of blood vessels. This involves (1) a unique laser system that uses water as the absorbing chromophore, (2) a clinically useful handpiece that is appropriate for microsurgery, (3) a novel albumin stent to support the vessel during anastomosis, (4) in vitro testing of the device to assess thermal damage, strength, and operative time. And (5) In Vivo animal testing will be added to Phase II. The goals of providing a 1.9um laser and an appropriate handpiece were accomplished in Phase I. Similarly the goals of manufacturing prototype albumin stents and applying them in vitro testing were met and proven effective by collection of pull test data to access joint strength, thermal damage studies and dissolution studies following application of the stents and laser 'soldering' process to repair swine blood vessels. A Phase II program, if funded, is expected to lead to development of a commercially testable system for micro-anastomosis of blood vessels.

DTIC

Blood Vessels; Bonding; Medical Services; Military Operations; Military Technology; Photochemical Reactions

20080041366 Society for Simulation in Healthcare, Hastings, MN USA
2007 Simulation Education Summit
Gordon, James; Mar 2008; 16 pp.; In English
Contract(s)/Grant(s): W81XWH-08-1-0019
Report No.(s): AD-A483800; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This contract supported the objective of this conference held October 2007 to produce consensus educational and

competency standards and guidelines for simulation in healthcare education leading to measurable improvements in patient safety.
DTIC
Education; Management Systems; Medical Services; Simulation

20080041545 NASA Johnson Space Center, Houston, TX, USA
Construction and Use of Resting 12-Lead High Fidelity ECG 'Superscores' for Detection of Heart Disease and Left Ventricular Systolic Dysfunction: Initial Results from the Enhanced ECG (E-ECG) Working Group
Schlegel, Todd T.; Arenare, Brian; Kuleez, Walter B.; Feiveson, Alan H.; Greco, E. Carl; DePalma, Jude L.; Stare, Vito; Vrtovec, Bojan; Rahman, M. Atiar; Bungo, Michael W.; Hayat, Matthew J.; Bauch, Terry; Delgado, Reynolds; Poulin, Greg; Warren, Stafford; Nunez, Tulio; Medina, Ruben; Jugo, Diego; Arheden, hakan; Pahlm, Olle; [2008]; 36 pp.; In English; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

OBJECTIVE. To investigate the accuracy of resting advanced 12-lead electrocardiography (ECG) in identifying heart disease and left ventricular systolic dysfunction (LVSD). MATERIALS and METHODS. Resting, high-fidelity, software-enhanced 12-lead ECG recordings (E-ECG, ~5 min supine) were obtained from 696 individuals, 418 of whom were healthy and 278 of whom had imaging-proven heart disease either with (N=90) or without (N=188) LVSD. Numerous conventional and advanced ECG parameters were evaluated for potential inclusion in E-ECG Superscores for distinguishing between groups. Superscores were obtained from multivariate logistic regression models optimized with both branch-and-bound and stepwise selection procedures and then cross-validated via both bootstrap and jackknife procedures. Advanced ECG parameters evaluated included those from nearly every resting ECG technique known to have diagnostic and/or prognostic value, including signal averaged ECG, high frequency ECG, 3-dimensional (spatial and spatiotemporal) ECG, studies of waveform complexity via singular value decomposition, and studies of the beat-to-beat variability of the QT, RR and other electrocardiographic intervals. RESULTS. Compared to optimized pooled conventional 12-lead ECG criteria alone, a cross-validated 10-parameter resting multivariate 12-lead E-ECG Superscore increased the sensitivity and specificity of resting ECG for detecting the presence versus absence of heart disease from 77% (72-82%) to 94% (90-96%) ($P < 0.0001$) and from 88% (85-91%) to 95%(93-97%) ($P < 0.0001$), respectively. In patients with known cardiac disease, another resting E-ECG Superscore containing eight parameters increased the positive predictive value of ECG for detecting LVSD from a predictably low 40% (33-47%) (pooled conventional ECG criteria alone) to 87% (79- 94%) ($P < 0.0001$) without compromising the already excellent negative predictive value (>90%) of ECG for LVSD. CONCLUSIONS. Resting 12-lead computer-enhanced ECG employing and combining the results of several advanced ECG techniques in software shows promise as a rapid, inexpensive and accurate tool for the detection of heart disease and LVSD.
Author
Electrocardiography; Heart Diseases; Multivariate Statistical Analysis; Imaging Techniques; Predictions; Detection

20080041607 Michigan State Univ., East Lansing, MI USA
Regulation of Oil Biosynthesis in Algae
Benning, Christoph; Moellering, Eric R; Miller, Rachel; Fedewa, Marie; Jun 25, 2008; 3 pp.; In English
Contract(s)/Grant(s): FA9550-07-1-0212
Report No.(s): AD-A483737; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483737

Many algae including Chlamydomonas accumulate triacylglycerols when cultures enter stationary phase leading to nutrient limitation. The identification of microalgal genes encoding the enzymes and regulatory factors required for the induction of oil biosynthesis is the immediate goal of the proposed work. Towards this end the following findings were met: 1.) A mutant screen to isolate gene disruption mutants of Chlamydomonas was established and 15 mutants were identified with altered lipid composition of a pool of 7000 tested transgenic lines. 2.) Conditions were established and gene expression profiles were compared under high and low N growth conditions. 700 genes were found to be differentially regulated, among these 5 encoding transcription factors. 3.) Oil bodies were isolated from induced Chlamydomonas and approximately 250 proteins associate with these oil bodies were identified. 4.) Four predicted enzymes of oil biosynthesis were isolated and cloned into yeast expression vectors. These genes and mutants are currently under investigation for their potential roles in oil biosynthesis in microalgae.
DTIC
Algae; Biosynthesis; Enzymes; Fuels; Oils

20080041611 State Univ. of New York, Brooklyn, NY USA

The Brain Tourniquet: Physiological Isolation of Brain Regions Damaged by Traumatic Head Injury

Ling, Douglas S F; Yang, Lie; Afroz, Sonia; Hsieh, ChangChi; Jun 19, 2008; 22 pp.; In English

Contract(s)/Grant(s): FA9550-06-1-0546

Report No.(s): AD-A483757; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483757

The objective of this study was to assess the feasibility of the 'brain tourniquet' concept, a new therapeutic approach to battlefield traumatic brain injury (TBI). The purpose of the brain tourniquet is to physiologically isolate damaged brain regions in order to allow head-injured warfighters to remain combat effective after sustaining brain trauma. This will also enhance recovery from this type of injury by preventing the spread of damage into otherwise healthy brain tissue and extending the 'golden hour' to reach comprehensive medical care. As such, the ultimate goal of the brain tourniquet is two-fold: 1) physiologically isolate injured brain regions to halt (or at least delay) the spread of neurological damage to uninjured brain areas, such as excitotoxicity, and 2) maintain or enhance normal physiological function in the intact, uninjured brain regions to preserve any remaining cognitive and motor function. This dual requirement is dictated by the unique demands of the battlefield environment, in which incapacitation of brain function renders the warfighter completely defenseless. The critical feature of this approach is that, if successful, it will enable head-injured soldiers to continue to function in the combat setting (i.e., for self-defense) until comprehensive medical care or medical evacuation can be effected.

DTIC

Brain; Injuries; Isolation; Medical Services; Physiology

20080041613 North Carolina Univ., Chapel Hill, NC USA

Nerve Muscle Interface for Prosthetic Feedback Control Proof of Concept in a Tissue Co-Culture System

Tommerdahl, Mark; Dennis, Robert; Nov 1, 2007; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-07-1-0049

Report No.(s): AD-A483760; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483760

The objective of the proposed work was to demonstrate that bi-directional communication via synthetic electrode arrays can be established between engineered tissues in cell culture (muscle and nerve) and that this communication can be exploited to control a remotely located robotic actuator. Specific applications of this technology will include peripheral nerve interfaces for the neurally based feedback control of human prosthetic devices, and the control of remote actuators and robotic agents via a direct peripheral nerve interface. Progress has been steady but slower than anticipated. Our progress is described in detail in the Summary of results.

DTIC

Culture Techniques; Feedback Control; Muscles; Nerves; Neuromuscular Transmission; Prosthetic Devices; Remote Control; Telecommunication; Tissues (Biology)

20080041614 Army Research Inst. of Environmental Medicine, Natick, MA USA

Effects of Indomethacin and Buprenorphine Analgesia on the Postoperative Recovery of Mice

Blaha, M D; Leon, L R; Jul 2008; 13 pp.; In English

Report No.(s): AD-A483768; M07-20; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483768

Buprenorphine (Bup) is the most commonly used analgesic in mice, yet few objective assessments address its superiority for postsurgical recovery. In mice, IP implantation of a radiotelemetry device induces decreases in body weight (BW), food and water intake (FI, WI), core temperature (Tc), and activity levels that persist approximately 14 d in the absence of analgesia. To compare the efficacy of (Bup with that of the nonsteroidal antiinflammatory drug indomethacin (Indo) for postsurgical recovery, male C57bl/6J mice were treated on the day of radiotelemetry implantation with (Bup (0.3 mg/kg SC) or Indo (1mg/kg SC) followed by treatment with Indo (1 mg/kg PO) on the next day ((Bup-Indo versus Indo-Indo_. Responses were compared between treatments in mice implanted with a radiotelemetry device and those that did not undergo surgery. Changes in BW, FI, WI, Tc, and activity were examined throughout 14 d of recovery. Indo-Indo was more efficacious in inhibiting postsurgical BW, FI, and WI reductions, compared with (Bup-Indo. (Bup also reduced BW and FI in the absence of surgery, indicating a nonspecific effect of this drug on these variables. Indo-Indo treatment was associated with higher activity levels during lights-on-to-lights- off transition periods compared with that observed with (Bup-Indo. According to 5 objective

measures of surgical recovery, our data suggest that Indo-Indo treatment is more efficacious than is (Bup-Indo for postsurgical recovery of radiotelemetry-implanted mice.
DTIC
Analgesia; Cores; Implantation; Mice; Sodium Carbonates; Surgery

20080041629 Maryland Univ., College Park, MD USA
Representation of Complex Dynamic Spectra in Auditory Cortex
Simon, Jonathan Z; Depireux, Didier A; Shamma, Shihab A; Jan 1997; 8 pp.; In English
Report No.(s): AD-A483813; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483813

Recent neurophysiological experiments have shed new light onto how various sound features are encoded and organized in the primary auditory cortex (AI). One such feature is the envelope of broadband acoustic spectra, or spectral profile, the most important physical correlate of timbre (Plomp 1976). To determine how AI units represent complex dynamic profiles, it is essential to measure their spectro-temporal response field (STRF). This function is analogous to the receptive field of visual neurons in that it reflects the strength and dynamics of the unit responses to tones at different frequencies. A more traditional response measure of auditory units is the response area , defined roughly as the range of tone frequencies and intensities that just elicit excitatory or inhibitory responses. The response area is only useful as a qualitative predictor of a unit's responses to arbitrary broadband spectra; its measurements is also significantly affected by a host of experimental difficulties and nonlinear factors that render estimates of parameters such as bandwidth and asymmetry quantitatively inaccurate (Shamma 1993, Shamma et al. 1995a, Nelken et al. 1994). To circumvent some of these problems, we have used new techniques to measure the spectral and dynamic properties of response areas in AI (Schreiner and Calhoun 1995, Shamma et al. 1995a). The stimuli and techniques adapted from vision research (De Valois 1990) and from psychoacoustic studies (Green 1986, Hillier 1991, Summers and Leek 1994) apply linear system theory to measure the response area of cortical units. Specifically, they employ broadband spectra with sinusoidally modulated profiles against the logarithmic frequency axis or ripples shown in Fig.1. By varying the ripple density (or frequency), amplitude, and drift velocity, one can measure a transfer function to such rippled spectra, and from it by an inverse Fourier transform obtain the STRF.
DTIC
Cerebral Cortex; Neurophysiology; Psychoacoustics; Visual Stimuli

20080041636 Walter Reed Army Inst. of Research, Silver Spring, MD USA
Phospholipase A2(PLA2) Regulates Neuroexocytosis to Counteract Botulinum Toxin A (BONT/A) Poisoning
Zhang, Xieping; Ishida, Hiroshi; Ray, Prabhati; Jul 1, 2003; 6 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483830; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483830

In this study, BoNT/A is one of the most serious biological threats faced by the U. S. military and allied forces. Previously we reported that in nerve growth factor (NGF)-differentiated PC12 cells, arachidonic acid (AA) release is associated with acetylcholine (ACh) release and BoNT/A inhibits both. We report the effect of PLA2 over expression on inhibition of ACh exocytosis due to BoNT/A light chain (LC) in PC12 cells. Over expression of PLA2 alone augmented the stimulated release of ACh and AA. PLA2 over expression also effectively prevented the inhibition of stimulated ACh and AA release due to BoNT/A LC.
DTIC
Bacteria; Clostridium Botulinum; Enzymes; Toxins and Antitoxins

20080041641 Naval Postgraduate School, Monterey, CA USA
The National Disaster Medical System's Reliance on Civilian-Based Medical Response Teams in a Pandemic is Unsound
Delaney, Jr, John B; Jun 2007; 10 pp.; In English
Report No.(s): AD-A483838; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483838

The world is threatened with a pandemic. Such an event, considered by many to be the greatest public health risk the world faces, has the potential to kill up to forty or fifty million people, sicken hundreds of millions, and significantly impact the global economy. Countries and health organizations throughout the world are monitoring the threat and developing strategic plans and systems to prepare for what many consider an inevitable and possibly imminent event. The USA has made

it a national priority to develop strategic plans to coordinate preparedness and response efforts at the federal, state, and local levels. A relatively small but critical aspect of these plans calls for the utilization of the National Disaster Medical System's (NDMS) civilian-based medical teams, to assist state and local governments in the event of a pandemic. Generally, past deployments of these federal assets have had positive results; however, the reliance on these civilian-based medical teams for response in a pandemic is problematic. The medical professionals who primarily comprise the team may be more reluctant to participate in a pandemic due to the increased health risks to themselves and their families. Moreover, the hospitals and medical systems that employ these civilian responders may be unwilling or unable to allow their participation in the federal response system. The federal government should reconsider its reliance on this civilian-based resource in the event of a pandemic, and focus instead on enhancing existing state and local public health and medical capabilities and resources.
DTIC
Disasters; Medical Personnel; Medical Services; Public Health; Teams

20080041645 Naval Postgraduate School, Monterey, CA USA
The Use of EMS Personnel as Intelligence Sensors: Critical Issues and Recommended Practices
Petrie, Michael; Sep 2007; 19 pp.; In English
Report No.(s): AD-A483844; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483844

The use of Emergency Medical Services (EMS) personnel as intelligence sensors or information collectors to provide information to Terrorism Early Warning Groups (TEWGs) and other local and state government intelligence fusion centers is recommended by numerous academic papers, professional articles and presentations, and U.S. Department of Homeland Security best-practice documents. These documents identify EMS personnel as valuable intelligence sensors, in part because they have access to locations not routinely available to law enforcement or intelligence communities that may contain indicators of terrorism. In spite of these recommendations, exceptionally few TEWGs have incorporated EMS personnel into their information collection systems. While many TEWGs are interested in integrating EMS collection assets, they have not developed this capability because they are confounded by the complex legal, operational, professional, cultural, and societal challenges of using EMS personnel in this capacity. Conversely, at least one intelligence fusion center developed an EMS-based information collection system, but overlooked federal and state medical confidentiality laws and other strategic issues. There has been no significant debate among federal, state, and local intelligence, EMS, law enforcement, homeland security, and medical communities regarding the best practices and strategic consequences of using EMS personnel as intelligence sensors. Absent an such an interdisciplinary debate leading to the development of model EMS information collection practice standards and the articulation of clearly defined public benefit, elected officials, the leadership of the EMS and medical communities, and other policymakers will not sanction the use of EMS personnel in this capacity, resulting in the inability to use EMS personnel as information collectors to prevent terrorism.
DTIC
Early Warning Systems; Emergencies; Health; Intelligence; Medical Services; Personnel; Procedures

20080041654 Materials Research Society, Warrendale, PA USA
Symposium FF: Molecular Motors, Nanomachines, and Active Nanostructures
Hess, Henry; Jun 23, 2008; 20 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-08-1-0121
Report No.(s): AD-A483859; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483859

This symposium intersects materials research with the other sciences (physics, chemistry, biology and engineering) by bringing together some or the world's foremost scientists who share the fascination of the generation or motion on the nanoscale. The organizers anticipated that this symposium would enable discussions that help identify future directions for the development of molecular machines and inspire collaborative investigations uniquely present in this field. Refer to attached summary and abstracts.
DTIC
Conferences; Energy Conversion; Nanostructures (Devices)

20080041674 Texas Univ., Brownsville, TX USA

Studies of Single Biomolecules, DNA Conformational Dynamics, and Protein Binding

Hanke, Andreas; Jul 11, 2008; 33 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-06-1-0408

Report No.(s): AD-A483908; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483908

While the Watson-Crick double-strand is the thermodynamically stable state of DNA in a wide range of temperature and salt conditions even at physiological conditions local denaturation bubbles may open up spontaneously due to thermal activation. By rising the ambient temperature, titration, or by external forces in single molecule setups bubbles proliferate until full denaturation of the DNA. Based on the Poland-Scheraga model we investigate both the equilibrium transition of DNA denaturation and the dynamics of the denaturation bubbles with respect to recent single DNA chain experiments for situations below, at, and above the denaturation transition. We also propose a new single molecule setup based on DNA constructs with two bubble zones to measure the bubble coalescence and extract the physical parameters relevant to DNA breathing. Finally we consider the interplay between denaturation bubbles and selectively single stranded DNA binding proteins.

DTIC

Biochemistry; Chemical Equilibrium; Deoxyribonucleic Acid; Proteins

20080041689 Walter Reed Army Inst. of Research, Washington, DC USA

Real-Time pcr Assay for Detection of Tetracycline Resistance Genes of Gram-Negative Bacteria

Fan, Wei; Hartman, Antoinette B; Lindler, Luther; Jul 1, 2003; 8 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483955; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483955

Doxycycline, a new generation tetracycline antibiotic, is currently one of choice for the treatment and prevention of infections caused by agents of biowarfare. We are developing real time PCR assays to detect tetracycline resistance genes in Gram-negative bacteria. The assay was developed as a multiplex SYBR Green I detection using the Roche Lightcycler and multi-melting peak analysis followed by a specific 5 nuclease assay. Specific primer pairs were selected for the PCR amplification of seven tetracycline resistance genes commonly found in Gram-negative organisms. A combination of primer pairs were used in a multiplex PCR reaction with SYBR Green I to detect a group of Tet resistance genes: tet(A), tet(B), tet(C), tet(D), tet(E), tet(G) and tet(H). Based on the melting peak analysis of our SYBR Green I reaction, we could preliminarily determine the class of the Tet resistance determinant that gave the positive signal. To confirm the result, we designed specific TaqMan primers and probes for each class of Tet determinant. Positive results were determined by comparing the Ct (crossing point) as well as DNA sequencing. We analyzed forty-eight clinical isolates by both assays. In 37 samples, the 5 nuclease assay confirmed the identity shown in SYBR Green I multiplex PCR reaction. 4 samples confirmed to be one uncommon tet gene (Tet J resistance determinant). Other 6 keep unknown. Our results demonstrate that the multiplex PCR assay with SYBR Green I is a method of significant saving in terms of labor and time in strains analysis. The SYBR Green I assay coupled with a class-specific 5 nuclease assay is a two-fold confirmation and identification of the Tet resistance genes present in Gram-negative organisms.

DTIC

Assaying; Bacteria; Genes; Real Time Operation; Tetracyclines

20080041703 Lincoln Univ., PA USA

Inhibitors of Apoptosis Affect DNA Degradation and Repair in Sulfur Mustard (HD)-Exposed Human Epidermal Keratinocytes (HEK)

Bhat, K R; Dierking, E L; Benton, B J; Ray, R; Jul 1, 2003; 6 pp.; In English

Report No.(s): AD-A484001; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA484001

In cultured HEK, we observed that HD (0.3-1.0 mM)-induced DNA damage triggers DNA repair and apoptosis, which may be interdependent. We studied the effects of a general caspase inhibitor, Z-VAD fmk (0.004 mM) and the Fas (CD95) receptor (induces apoptosis on Fas ligand binding) antibody on DNA damage and its repair in HD-exposed HEK. Both Z-VAD-fmk and the CD95 antibody reduced HD-induced DNA degradation possibly by decreasing DNA degradation or enhancing DNA repair or both. These inhibitors may be useful for modulating DNA repair and apoptosis in HD-exposed cells with potential applications in medical management of HD-induced vesication.

DTIC

Apoptosis; Cells (Biology); Degradation; Deoxyribonucleic Acid; Epidermis; Inhibitors; Medical Services; Skin (Anatomy); Sulfur

20080041723 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA
Enzymatic Analysis of G- and V-Agents and Their Degradation Products
Elashvili, Ilya; Jul 1, 2003; 8 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484084; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484084

We are presenting a rapid and highly reliable analytical methodology for nerve agents and their degradation products. The approach is to augment existing analytical methods with the specificity of the enzymatic degradation of the agents and their phosphonate ester products. The nerve agents can be hydrolyzed to their respective methylphosphonate alkyl ester (h-agent) products by alkali treatment or by specific hydrolytic enzymes, such as organophosphorus hydrolase (OPH) and organophosphorus acid anhydrolase (OPAA). A bacterial phosphonate ester hydrolase enzyme (PEH) would further degrade hagents to methylphosphonic acid (MPA). The methodology is based on using these specific enzymes in two different schemes: 1) rapid screening for MPA (e.g. MS/MS) after the sample treatment with all three enzymes and 2) thorough analysis of the agent by creating a unique fingerprint from each agent through the appropriate enzymatic treatment. Initially, the agent would be identified and quantified (e.g. GC-FPD) from the fingerprint consisting of the original agent and silylated enzymatic degradation products, h-agent and MPA, by comparing the unique retention times of each analyte. The agents and their products can be further interrogated by the existing instrumental methods (e.g., LC/MS, GC/MS, and GC/MS/MS) for their eventual identification. Furthermore, since PEH can degrade alkyl and aryl esters of other phosphonates besides MPA esters, approach can be expanded to develop the capability to analyze potential novel threat OP CWAs and their degradation products. For this purpose, we are currently developing databases of the GC-FPD and GC/MS profiles for selected alkyl phosphonic acids and their alkyl esters.
DTIC
Degradation; Enzyme Activity; Enzymes

20080041725 Croatian Military Academy, Zagreb, Croatia
An Evaluation of Bioregulators/Modulators as Terrorism and Warfare Agents
Bokan, Slavko; Orehovec, Zvonko; Jul 1, 2003; 12 pp.; In English
Report No.(s): AD-A484086; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484086

Bioregulators or modulators are biochemical compounds, such as peptides, that occur naturally in organisms. Advances in biotechnology thus create the potential for the misuse of peptide bioregulators in offensive biological weapons programmes. They are new class of weapons that can damage nervous system, alter moods, trigger psychological changes and kill. Within neuroscience over the last twenty years has been an explosion of knowledge about the receptor systems on nerve cells that are of critical importance in receiving the chemical transmitter substances released by other nerve cells. The potential military or terrorism use of bioregulators is similar to that of toxins. Together with increased research into toxins, the bioregulators have also been studied and synthesized. This paper presents evaluation of bioregulators that can be used as terrorism delivery system or biological agents in hostile activities.
DTIC
Chemical Warfare; Modulators; Peptides; Terrorism; Warfare

20080041730 Alabama Univ., Birmingham, AL USA
The Role of Mutant p53 in Progression of Prostate Cancer
Liu, Gang; Dec 2005; 22 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-04-1-0079
Report No.(s): AD-A484103; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484103

p53 mutation is frequently found in advanced prostate cancers (CaP) such as androgen independent CaP which suggests that mutant p53 may have a role in the progression of CaP. By generating of a series of prostate cancer cell lines in which wild-type or mutant p53 is knocked down and (or) various mutant p53 are simultaneously expressed we found that knock-down of wild-type p53 confers CaP cells resistance to DNA damage-induced apoptosis. In addition knock-down of mutant p53 renders CaP cells more sensitive to DNA damage-induced apoptosis. However CaP cell death upon deprivation of androgen is independent of wild-type p53. Moreover knock-down of mutant p53 is unable to convert the androgen-independent CaP cells to androgen-dependent ones. Interestingly re-introduction of mutant p53 into wild-type p53 knock-down CaP cells further increases their resistance to DNA-damage induced apoptosis. More importantly re-introduction of mutant p53 into wild-type

p53 knock-down CaP cells promotes their androgen-independent growth. Finally we found that p53 activation upon DNA damage is impaired by deprivation of androgen.
DTIC
Cancer; Prostate Gland

20080041731 Pennsylvania Univ., Philadelphia, PA USA
The Role of Ras in Myc-induced Mammary Tumorigenesis
Jang, Joanne; May 1, 2006; 11 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0327
Report No.(s): AD-A484104; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484104

We have previously demonstrated that MYC or Wnt1 oncogene induction in the murine mammary epithelium results in the formation of mammary tumors. Kras2 mutations in either MYC or Wnt1-induced tumors correlate with oncogene-independent growth while Hrasl mutations do not. Kras2 mutations in MYC and Wnt1-induced tumors also exhibit higher levels of ras and MAPK pathway activation than do tumors that are wild-type for ras or tumors harboring Hrasl mutations. The next phase of this project includes introducing regulatable activated Kras2 and Hrasl alleles into MYC and Wnt1-induced tumors. Although attempts at constructing a mifepristone-inducible system and using retroviral vectors were not successful future efforts may require creating a different inducible system or adjusting the retroviral infection protocol to manipulate Kras2 or Hrasl independently of MYC or Wnt1.
DTIC
Diseases; Genetics; Mammary Glands; Neoplasms

20080041732 Childrens Research Inst., Washington, DC USA
Molecular Aspects of Muscle Damage and Denervation with Public Access Tools
Hoffman, Eric P; Dec 2005; 20 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-04-1-0081
Report No.(s): AD-A484106; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484106

Two Tasks were originally proposed; one was design, coding and implementation of PEPR (Public expression profiling resource). This was accomplished, and PEPR has become one of the most heavily used mRNA expression profiling (microarray) resources worldwide. We have populated with 7,000 microarray profiles, of which many are related to nerve and muscle damage and repair, and are of high relevance to health of the military. Of these, approximately 3,000 microarray profiles are in the public domain arm of PEPR, and have been co-submitted to NIH NCBI GEO through an automated data submission pipeline developed under the auspices of this award. Downloads of microarray data by the international research community is provided at no charge, and currently averages about 6,000 array downloads per month. This has effectively parallelized research on issues of importance the health of military recruits, including brain trauma, spinal cord injury, muscle exercise, muscle damage, and regenerative science. We also designed, coded and implemented HCE (Hierarchical Clustering Explorer). This powerful public domain software package has been downloaded by thousands of investigators, and facilitated thousands of research studies. Task 2 was focused on the proteomics of muscle atrophy and repair. Through support of the DoD award, we established proteomics expertise in the Research Center for Genetic Medicine. We also increased knowledge of the molecular pathways in muscle and nerve, damage. 21 publications in peer reviewed journals supported in whole or in part by the 2 yr DoD award. Some of these have been cited by the journals as 'most highly accessed' of papers published.
DTIC
Atrophy; Damage; Muscles

20080041795 Sloan-Kettering Inst. for Cancer Research, New York, NY USA
Trial of Huanglian, a Novel Botanical against Breast Cancer that Enhances Taxol Activity. Phase 1 and 2
Schwartz, Gary K; Oct 2005; 9 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-02-1-0486
Report No.(s): AD-A484108; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Huanglian is a botanical prepared from the root of Coptis chinensis and deltoidea. We reported that huanglian inhibits growth of breast cancer cells in vitro in a dose-dependent manner (Li X. et al. Molecular Pharmacology 58: 1287-1293 2000). Based on these results we developed huanglian as an herbal extract packaged in 250 mg capsules suitable for human clinical

trials. We have treated 26 patients on the phase I trial of huanglian. We observed grade 3 diarrhea in one of six patients at cohorts 6 (5.25 gm/day) and 8 (8.25 gm/day) respectively. However because of capsule number at this highest dose (33 capsules/day in 4 divided doses) further dose escalation did not appear feasible. We therefore elected to increase the amount of huanglian in the capsules from 250 to 500 mg. It took over a year to identify a new source of root from China that would meet our strict biochemical' profile for Huanglian. With 500 mg capsules we have now been able to escalate to a dose of 10 gm/day. We have had one patient with dose-limiting nausea and vomiting and the cohort is expanded to 6 patients. We anticipate recommending a dose of 8 gm/day for phase II trials.
DTIC
Breast; Cancer; Mammary Glands; Medical Science

20080041797 Minnesota Univ., Minneapolis, MN USA
SoyCaP: Soy and Prostate Cancer Prevention
Hamilton-Reeves, Jill M; Kurzer, Mindy S; Slaton, Joel; Nov 2007; 44 pp.; In English
Contract(s)/Grant(s): W81XWH-06-1-0075
Report No.(s): AD-A484123; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The main objective of this project is to evaluate the effects of soy phytoestrogens on reproductive hormones and prostate tissue markers of cell proliferation and androgen action in men at high risk of prostate cancer. The hypothesis is that alteration of endogenous hormones is a mechanism by which soy phytoestrogens prevent prostate cancer. A randomized parallel arm study is being performed, in which 58 men at high risk of prostate cancer were randomized to receive one of three dietary supplements for six months: 1) soy protein isolate containing isoflavones; 2) isoflavone-poor soy powder; or 3) isoflavone-free milk powder. Urine and blood is collected at 0, 3 and 6 mo, for evaluation of serum hormones and prostate specific antigen, as well as urinary estrogen and phytoestrogen metabolites. At 0 and 12 mo, prostate biopsies aperformed to evaluate prostate tissue expression of apoptosis (Bax, Bcl-2), proliferation (PCNA), and androgen receptor density. We found isoflavone-rich soy protein isolate suppressed androgen receptor density, increased urinary estrogen excretion and increased the 2:16-OH estrone ratio in the urine. We also observed a trend toward a lower rate of prostate cancer in the men in the soy groups compared to the men in the milk group
DTIC
Cancer; Prevention; Prostate Gland; Proteins

20080041799 Research Triangle Inst., Research Triangle Park, NC USA
Motivational Interventions to Reduce Alcohol Use in a Military Population
Brown, Janice M; Mar 2008; 80 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-04-1-0072
Report No.(s): AD-A484134; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The overriding objective of this research is to reduce hazardous drinking in a military sample by implementing two motivational interventions and comparing them to a treatment-as-usual condition. Individuals who are referred to the Air Force Alcohol and Drug Abuse Prevention and Treatment (ADAPT) program as the result of an alcohol incident or who are self-referred are randomly assigned to one of three interventions: (1) a group motivational intervention (2) an individual motivational intervention or (3) a treatment-as-usual group. All participants provide data regarding drinking and related problems at baseline and at 3 6 and 12 months following the interventions. Analyses focus on (1) determining the effectiveness of the interventions in reducing alcohol use and alcohol-related problems (2) testing factors that may mediate or moderate responses to the interventions and (3) determining the cost and cost-effectiveness of treatment. The research includes a large sample and an extended follow-up on intervention effects components that most previous intervention studies have lacked. From a practical perspective the ability to classify which individuals will benefit from a motivational intervention has important military readiness and alcohol policy implications.
DTIC
Alcohols; Armed Forces (United States); Drugs; Military Personnel; Motivation; Populations; Therapy

20080041801 University of Southern Mississippi, Hattiesburg, MS USA
Developing Molecular Methods to Identify and Quantify Ballast Water Organisms: A Test Case with Cnidarians
Kreiser, Brian R; Apr 15, 2004; 60 pp.; In English
Report No.(s): AD-A484136; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The potential for organisms to be transported by ballast water is well documented. Furthermore, biological invasions

mediated by ballast water transport have led to some rather severe economic and ecological consequences as seen in the examples of the zebra mussel and green crab. Unfortunately, this is not necessarily a new phenomenon. As long as ships have traveled so have these sorts of stow away organisms. However, what has changed is the rate of invasions. Bigger ships, with greater volumes of ballast water, are traveling faster which increases the abundance and survival of organisms in their ballast tanks. The growing recognition of the consequences of invasive species has led to much effort in improving our basic understanding of the role of ballast water. One key question is simply what species are being transported? Various studies have documented the presence of a tremendous diversity of non-indigenous species in ballast water. Importantly, the authors of these studies acknowledge that these numbers are underestimates since larval forms, as well as the adults, of species in many groups cannot be easily distinguished based on morphology. Thus, characterization of the taxa present in ballast water samples is often restricted to the taxonomic level of order, class or even phylum.
DTIC
Marine Biology; Molecular Biology; Organisms; Water

20080041804 NTI, Inc., Fairborn, OH USA
A Fatigue Management System for Sustained Military Operations
Storm, William F; Mar 31, 2008; 104 pp.; In English
Contract(s)/Grant(s): DAMD17-00-2-0055
Report No.(s): AD-A484144; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This research program consisted of four tasks, three of them specific research experiments. The fourth major objective was to extend the model of a software-based scheduling tool that predicts cognitive performance based on sleep and circadian patterns. The three experiments systematically evaluated the use and the impact of selected hypnotics and alertness medications to enhance operator performance during sustained military operations. The results for the first experiment were published in the January 2007 issue of Aviation, Space and Environmental Medicine. The findings demonstrated significant decrements in cognitive performance when suddenly awakened while sleeping under the influence of zolpidem but not melatonin, Performance and polysomnography data from the second study evaluated the combined use of sleep aids (zolpidem or temazepam) and alertness aids (dextroamphetamine and melatonin) to extend performance and alertness during a simulated 120-hour bomber surge operation. Performance under the Placebo condition deteriorated significantly during the latter portions of each of three successive 24-hour missions but not under the four drug-combination conditions, which did not differ from each other throughout the missions. The third study demonstrated the potential efficacy of sublingual doses of flumazenil to reverse the soporific effects of zolpidem on performance in an operationally-relevant, sudden-awakening paradigm. Publishable reports are in preparation for the latter two studies.
DTIC
Management Systems; Military Operations; Sleep

20080041807 Columbia Univ., New York, NY USA
CHEK2*1100delC Variant and BRCA1/2-Negative Familial Breast Cancer - A Family-Based Genetic Association Study
Ahsan, Habibul; Oct 2007; 7 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-03-1-0774
Report No.(s): AD-A484150; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We propose to examine the association between the CHEK2*1100delC gene variant and breast cancer among BRCA1/2-negative families. Vital to DNA replication and normal growth of breast cells (like all other cells in the body) is their ability to detect aberrations/damage in the DNA, and subsequently to halt the replication process, correct errors if possible, and either resume normal cell replication or initiate cell death. The CHEK2 gene, the human ortholog of yeast CDS1 and Rad53, encodes a cell-cycle checkpoint kinase that plays a role in DNA repair processes involving BRCA1 and p53 and is thus a candidate gene for familial breast cancer and Li-Fraumeni Syndromes (LFS). The proposed study, by examining CHEK2 in familial breast cancer, will provide additional knowledge to enhance our understanding of the role of CHEK2 gene in breast cancer. By estimating the absolute and relative risk of breast cancer in relation to the CHEK2*1100delC variant, the proposed study will offer direct evidence on assessing genetic risk of familial breast cancer.
DTIC
Breast; Cancer; Epidemiology; Genes; Genetics; Mammary Glands

20080041813 Charles R. Drew Univ. of Medicine and Science, Los Angeles, CA USA

Modulation of Stem Cells Differentiation and Myostatin as an Approach to Counteract Fibrosis in Muscle Dystrophy and Regeneration after Injury

Gonzalez, Nestor F; Mar 2008; 102 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-07-1-0181

Report No.(s): AD-A484168; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Muscle derived stem cells (MDSC) were isolated from the myostatin wild type mouse (Wt) the myostatin knock out mouse (Mst ko) and a DMD mouse model (mdx) and shown that: 1) Implants of Wt MDSC regenerate in vivo smooth muscle tissue and other cell types in injured or impaired tissue and correct the functional dysfunction created by the loss of these cells and myofibroblast generation and also convert into myofibers in skeletal muscle thus showing MDSC responsiveness to in vivo paracrine modulation of cell lineage. 2) Wt MDSC express an embryonic stem cell marker Oct-4 and cells positive for this marker were located in vivo in the skeletal muscle using a transgenic mouse model that detects Oct-4 expression with a reporter gene; 3) Wt and Mst ko MDSC were unexpectedly resistant to in vitro paracrine and autocrine modulation of myogenesis by effectors of the myostatin pathway but our previous results suggest that MDSC differentiation is responsive in vivo to factors in the tissue environment. 4) Myostatin pro-fibrotic role was shown in a multipotent cell line the C3H 10T1/2 and in vivo in stem cells in connective tissue thus confirming our proposal to counteract myostatin in MDSC or in the host tissue for the therapy of DMD.

DTIC

Fibrosis; Injuries; Modulation; Muscles; Stem Cells

20080041815 Creighton Univ., Omaha, NE USA

Impact of Erb-B Signaling on Myelin Repair in the CNS Following Virus-Induced Damage

Drescher, Kristen M; Mar 2008; 20 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-07-1-0223

Report No.(s): AD-A484171; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The objective of these studies is to examine the impact of erbB-mediated signaling on myelin destruction and repair in a novel murine model of central nervous system (CNS) demyelination. In these studies, we utilize a model of demyelination triggered by direct injection of Theiler's murine encephalomyelitis virus (TMEV) into the spinal cord. This method of lesioning permits us to precisely identify the age and site of a lesion. We hypothesize that increased erbB-mediated signaling will protect animals from disease. Conversely, reduced signaling will worsen disease. Toward the goals of this project, we have generated three recombinant adenoviral constructs that will be used to exogenously increase the level of ligand available to the receptors, thus examining whether enhanced signaling via erbB family members will enhance protection of the CNS. We have identified the major cell type harboring virus in this model (macrophages) and have begun to examine the effects of infection on myelin gene transcription.

DTIC

Central Nervous System; Damage; Maintenance; Myelin; Proteins; Viruses

20080041816 Purdue Univ., West Lafayette, IN USA

Breast Cancer and Early Onset Childhood Obesity: Cell Specific Gene Expression in Mammary Epithelia and Adipocytes

Camarillo, Ignacio; Nichols, Maxine; Jul 2006; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0473

Report No.(s): AD-A484172; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Obesity has become a major health problem in children and adults and is associated with increased breast cancer incidence and mortality. The epidemic of childhood obesity is recent and little information exists regarding its association with mammary tumorigenesis. Towards better understanding this relationship we have developed and characterized a new rat model of childhood onset Diet Induced Obesity (DIO) and breast cancer. We have shown that young female rats fed a high fat Western Style diet have a 2-fold higher body fat mass and elevated serum comorbidity factors as compared to Chow fed Lean rats. When these animals are treated with the carcinogen MNU mammary tumors appear sooner and in greater numbers in Obese rats. We determined via histology that tumors from Obese rats are of a more invasive type compared to tumors from Lean rats. This is in accord with the association between human obesity and breast cancer mortality. This new model parallels the onset of obesity as it occurs in humans and therefore provides an excellent system to study the underlying mechanisms of obesity and mammary tumor formation and progression. Our long-term goals are to exploit this model to better understand

adipocyte-epithelial interactions during mammary tumorigenesis identify and validate novel molecular therapeutic targets and to establish biomarkers for cancer prevention and prognosis.
DTIC
Adipose Tissues; Breast; Cancer; Diets; Gene Expression; Mammary Glands; Obesity

20080041817 South Carolina Univ., Columbia, SC USA
Brain Imaging Research: The Detection of Deception Utilizing HD-ERP,
Vendemia, Jennifer M; Jan 1, 2008; 61 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-06-1-0272
Report No.(s): AD-A484173; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The goal of this project is to create a functioning laboratory at the University of South Carolina whose purpose was to conduct research on central nervous system mechanisms (with fMRI and HD-ERPs) involved in deceptive behavior. The most intensive part of the project was the construction of an fMRI facility within the Palmetto Health Hospital, and training for faculty and staff at the University of South Carolina who would use the fMRI as a research tool. The next goal of the project was to create a database for the storage of a large number of archived HDERP (high-density event-related potential) data sets (approximately 1000 archived cases), and the systematic storage of all future data collected at the site. The database will ultimately be available to interested researchers who wish to study detection of deception. The next goal was to develop a suite of data analysis and display tools with a graphic user interface to work with large arrays of data, and provide a test bed for specific algorithms related to CNS models of deception. Research within our laboratory assesses fMRI and HD-ERP measures of deception in parallel (not simultaneously) then employs a strategy of dipole source localization to reconcile the data. The ultimate goal of our research agenda is to test a variety of aspects of our model of deceptive behavior. Towards that end we have multiple research projects underway that apply to unique constructs within the model. These include, but are not limited to: 1). Executive function, 2) emotional traits, 3) personality traits, 4) attention switching, and 5) workload. The study targeting executive function is still in data acquisition at this time. A pilot study using HD-ERPs examining the impact of depression on deceptive behavior is in final data analysis. The study on personality traits is still in the early stages of item development. The study on attention switching has completed piloting, and is being conducted with an adequate sample size.
DTIC
Brain; Central Nervous System; Deception; Emotions; Graphical User Interface; Imaging Techniques; Magnetic Resonance; Personality; Workloads (Psychophysiology)

20080041818 Jackson (Henry M.) Foundation, Rockville, MD USA
Epidemic Outbreak Surveillance (EOS)
Scofield, Thomas C; Walter, Elizabeth; Livingstone, Samuel J; Jul 2006; 17 pp.; In English
Contract(s)/Grant(s): W81XWH-04-1-0669
Report No.(s): AD-A484174; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This funding is established to support Operations and Management. The goal of the project is to develop and test new technologies for the diagnosis and surveillance of respiratory tract pathogens. This funding supported purchase of supplies and shipping services necessary to carry out protocols to standardize methods of specimen collection and to optimize processing of these specimens. After these processes were established initial supplies were purchased in order to begin enrollment of healthy ill and recovered Basic Military Trainees (BMTs) in order to compare methods of detection of respirator and host response. This funding enabled successful initiation of the project.
DTIC
Research Management; Surveillance

20080041835 University of Southern California, Los Angeles, CA USA
Dietary Fat, Fat Metabolizing Genes and Prostate Cancer Risk in African-Americans and Whites
Ingles, Sue A; Dec 2005; 8 pp.; In English
Contract(s)/Grant(s): W81XWH-04-1-0111; W81XWH-04-1-0480
Report No.(s): AD-A484212; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Dietary fat has been implicated as a potential promotional factor leading to the progression of small, latent, nonmetastatic prostate tumors to invasive, metastatic lesions. One possible mechanism is conversion of the n-6 polyunsaturated fatty acids to inflammatory compounds produced by the lipoxygenase (LOX) family of enzymes. The authors are examining whether genetic variants in the n-6 fatty acid LOX pathways are associated with the risk of prostate cancer in a population-based case

control study of advanced prostate cancer among African Americans and whites in Los Angeles County. In the first two years of the study, the authors genotyped five LOX gene polymorphisms, including 12-LOX Gln261Arg and Ser322Asn, 15-LOX-2 Gln656Arg, 5-LOX Lys254Glu, and the 5-LOX promoter Sp1 motif polymorphism. Preliminary analyses indicate that the 12-LOX gene Gln261Arg polymorphism may be related to prostate cancer risk in both African Americans and whites. In the third year, they will investigate whether genetic variation in specific LOX pathways, in combination with diet, contributes to prostate cancer risk. Their findings could provide a scientific foundation upon which to design dietary intervention trials and may allow them to design strategies for reducing the disparity in prostate cancer burden between African Americans and other ethnic groups.
DTIC
Africa; Cancer; Diets; Fats; Fatty Acids; Genes; Liquid Oxygen; Polymorphism; Prostate Gland; Races (Anthropology); Risk

20080041838 Ohio State Univ., Columbus, OH USA
Hunting for Novel X-Linked Breast Cancer Suppressor Genes in Mouse and Human
Liu, Yang; Mar 2007; 69 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-06-1-0366
Report No.(s): AD-A484222; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A priori X-linked tumor suppressor genes would be of great interest as one allele of these genes might be silenced due to X-chromosome inactivation. The X-linked Foxp3 is a member of the forkhead/winged helix transcription factor family. Germ-line mutations cause lethal autoimmune diseases in males. Serendipitously we observed that Foxp3sf/+ heterozygous mice developed cancer at a high rate. The majority of the cancers were mammary carcinomas in which the wild-type Foxp3 allele was inactivated and ErbB2 was over-expressed. Foxp3 bound and repressed the ErbB2 promoter. Deletion functionally significant somatic mutations and down-regulation of the FOXP3 gene were commonly found in human breast cancer samples and correlated significantly with HER-2 over-expression regardless of the status of HER-2 amplification. In toto the data demonstrate that FOXP3 is an X-linked breast cancer suppressor gene and an important regulator of the HER-2/ErbB2 oncogene.
DTIC
Breast; Cancer; Mammary Glands; Mice; Oncogenes; Suppressors

20080041839 Stanford Univ., Stanford, CA USA
Cells With Unique Properties in Prostate Cancer-Associated Storma Are Mesenchymal Stem Cells
Peehl, Donna M; Jun 2007; 8 pp.; In English
Contract(s)/Grant(s): W81XWH-06-1-0101
Report No.(s): AD-A484223; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Our objective was to explore the hypothesis that prostate cancer-associated stromal cells are derived, at least in part, from mesenchymal stem cells. Our objective was to show that cancer-derived stromal cells capable of anchorage-independent growth have characteristics of stem cells and convert nontumorigenic prostatic epithelial cells to tumorigenicity. We could not identify cells capable of anchorage-independent growth, so we sought other stem cell markers. We pinpointed CD90 as a marker associated with mesenchymal stem cells that is overexpressed in cancer-derived stromal cells. In the no-cost extension period that we have requested, we will determine whether CD90-positive cells are capable of multilineage differentiation, and transforming nontumorigenic prostatic epithelial cells to tumorigenicity. Our studies also continue to point to high expression of transforming growth factor-beta as a key feature of prostate cancer-derived stromal cells that has also been to stem cell phenotypes.
DTIC
Cancer; Prostate Gland; Stem Cells

20080041840 California Univ., Berkeley, CA USA
Elucidating and Modeling Irradiation Effects on Centrosomal and Chromosomal Stability within Breast Cancer
Maxwell, Christopher A; Feb 2007; 5 pp.; In English
Contract(s)/Grant(s): W81XWH-06-1-0524
Report No.(s): AD-A484224; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Elucidating and modeling irradiation effects on centrosomal and chromosomal stability within breast cancer. Background: At the cellular level, ionizing radiation (IR) represents an empirical and reproducible insult that elicits a well characterized cellular response. Genetic alterations, cell cycle effects and IR-induced chromosomal instability are defined-byproducts of

irradiation as is centrosomal amplification. The centrosome represents the major microtubule organizing center of the dividing cell and along with the nucleus, is precisely replicated during each cell cycle. It is postulated that centrosomal amplification translates into tetraploid, through mitotic catastrophe, or aneuploid, through aberrant division, daughter cells. At this tissue level, centrosomal deregulation has been identified within the majority of malignancies and is positively correlated with chromosomal instability, higher grade tumors and patient survival. At the cellular level, we would like to investigate the mitotic outcomes downstream of irradiation induced centrosomal amplification and develop a mathematical model for this process that can be translated to different genetic backgrounds and, in the future, different micro environmental cues and tissues.
DTIC
Breast; Cancer; Chromosomes; Irradiation; Mammary Glands; Stability

20080041841 Nebraska Univ., Omaha, NE USA
Development of Targeted Nanogels for the Sirna-Mediated Antiangiogenesis Treatment of Breast Cancer
Vetro, Joseph A; Vinogradov, Serguei V; Singh, Rakesh K; Aug 2007; 8 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-06-0655
Report No.(s): AD-A484225; No Copyright; Avail.: Defense Technical Information Center (DTIC)
The inhibition of tumor angiogenesis has significant potential as a therapeutic modality in the treatment of breast cancer. Delivering small, interfering RNA (siRNA) to activated breast microvascular endothelial cells (MVEC) can decrease the expression of proteins required during tumor angiogenesis and lead to less toxic and more effective breast cancer treatments but is limited by the absence of efficient targeted drug delivery vehicles. Nanogels (NG) composed of cross-linked polyethylene glycol and polyethylenimine (PEG-cl-PEI) were investigated for targeted siRNA delivery to activated breast MVEC. Targeted NG inhibited activated murine breast MVEC growth and vessel-like formation in vitro with little cytotoxicity irrespective of loaded siRNA. This indicates that unmodified and targeted NG inhibit MVEC by some mechanism unrelated to siRNA or detectable cytotoxicity and that first generation NG are insufficient for siRNA delivery. Similar observations delivering nucleoside analogs in other cells were overcome with biodegradable NG. Therefore, we are now assessing the potential of using biodegradable NG as a platform for further development as a targeted siRNA delivery vehicle.
DTIC
Breast; Cancer; Mammary Glands

20080041848 Beth Israel Deaconess Medical Center, Boston, MA USA
Role of PAK6 in Prostate Cancer
Kaur, Ramneet; Apr 2007; 17 pp.; In English
Contract(s)/Grant(s): W81XWH-04-1-0865
Report No.(s): AD-A484238; No Copyright; Avail.: Defense Technical Information Center (DTIC)
PAK6 is a serine threonine kinase whose expression is increased in prostate cancer. We have tried to understand the role played by PAK6 in PCa by finding its interacting partners. We have developed a strategy to find its interacting partners by tagging the protein with triple FLAG epitope, immunoprecipitating the protein using FLAG beads, elution by using triple FLAG peptide, running the eluted material on the gel, silver staining the gel and then mass spectrometry analysis is done on the specific bands. By this approach we have found nucleolin to be PAK6 interacting protein. Nucleolin is involved in cellular proliferation and it has also a role to play in cancer. Our another finding has shown that PAK6 is activated by MKK6 and p38 MAP kinase, so it implies PAK6 has some role to play under stress conditions. Nucleolin is also phosphorylated by p38 and its RNA binding ability increases under genotoxic stress depicting link between two findings. Another important potential partners of PAK6 found by this strategy are IQGAP1 and PP2C. Increased expression of PAK6 in androgen independent conditions suggests the role of PAK6 in androgen independent prostate cancers.
DTIC
Cancer; Enzymes; Phosphorus; Prostate Gland; Proteins

20080041850 Texas Univ., Arlington, TX USA
Simultaneous Monitoring of Vascular Oxygenation and Tissue Oxygen Tension of Breast Tumors Under Hyperbaric Oxygen Exposure
Xia, Mengna; Liu, Hanli; Apr 2007; 23 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-04-1-0411
Report No.(s): AD-A484242; No Copyright; Avail.: Defense Technical Information Center (DTIC)
Objective/Hypothesis: By monitoring global and local vascular oxygenation and tissue oxygen tension in breast tumors

under HBO exposure with several different gas interventions, we wish to prove the following two hypotheses: that 1) the combination of HBO and hyperoxic intervention can largely improve breast tumor oxygenation, and that 2) tumor oxygenation remains elevated for a period of time even after HBO exposure, which may provide a unique treatment window to enhance radiosensitivity. Specific Aims: Aim 1: to determine the absolute values of oxygenated hemoglobin concentration, [HbO2], and hemoglobin oxygen saturation, SO2, in solid breast tumors from the NIRS measurements. Aim 2: to investigate vascular oxygenation and tissue oxygen tension of breast tumors under continuous normobaric and hyperbaric oxygen exposures with several gas interventions, using both a single-channel NIRS system and 3-channel FOXY pO2 system simultaneously. Aim 3: to investigate global and local dynamics of tumor vascular [HbO2] and tissue pO2 of breast tumors immediately after HBO exposure using both three-channel NIRS and 19F MR EPI imaging simultaneously.
DTIC
Breast; Cancer; Cardiovascular System; Exposure; Infrared Spectroscopy; Mammary Glands; Near Infrared Radiation; Oxygen; Oxygen Tension; Oxygenation; Tumors

20080041855 Columbia Univ., New York, NY USA
Checkpoint Functions of the BRCA1/BARD1 Tumor Suppressor
Modi, Ami; Jul 2007; 6 pp.; In English
Contract(s)/Grant(s): W81XWH-06-1-0323
Report No.(s): AD-A484257; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The breast and ovarian-specific tumor suppressor BRCA1 has been implicated in numerous cellular processes, including DNA repair, cell cycle checkpoint control, and mitotic spindle assembly. In vivo, BRCA1 primarily exists in association with BARD1 and the BRCA1/BARD1 heterodimer is thought to mediate the tumor suppression activity of BRCA1. It has been previously shown that the phosphorylation state of the BARD1 polypeptide is cell cycle regulated and that BARD1 is hyperphosphorylated in mitosis at seven distinct residues. To study the function of mitotic BARD1 phosphorylation, I used an siRNA-mediated approach to knockdown endogenous BARD1 expression and then restore expression with siRNA-resistant exogenous forms of BARD1. In this manner, I will evaluate the role of BARD1 mitotic phosphorylation in the G2 accumulation checkpoint, decatenation checkpoint, and homology-directed DNA repair. My initial studies showed that siRNA-mediated knockdown of BARD1 leads to a considerable IR-induced G2 accumulation checkpoint defect, illustrated by an ~8-fold increase in the percent of cells that enter mitosis following IR damage relative to control cells. Reconstitution experiments with mRNAs resistant to knockdown by BARD1-specific siRNAs resulted in ~3-fold decrease in the percentage of cells that escape the IR-induced G2 accumulation checkpoint. We are currently testing the role of individual phosphorylation sites in the checkpoint by reconstituting BARD1-depleted cells with siRNA-resistant BARD1 polypeptides bearing mutations of specific phosphorylation sites.
DTIC
Cancer; Genes; Phosphorylation; Proteins; Ribonucleic Acids; Suppressors; Tumors

20080041858 Jackson (Henry M.) Foundation, Rockville, MD USA
Physiologic and Endocrine Correlates of Overweightness in African Americans and Caucasians
Deuster, Patricia A; Mar 2008; 14 pp.; In English
Contract(s)/Grant(s): DAMD17-03-2-0024
Report No.(s): AD-A484264; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Obesity has reached epidemic levels and yet the incidence continues to rise. This study examines the hypothesis that obesity may reflect a dysfunction of the hypothalamic-pituitary-adrenal (HPA) axis in response to stressors. African American persons are at greatest risk, but reasons for this difference are unknown. The authors will study 127 men and women of Caucasian and African American ethnicity to examine their responses to physiologic stressors: exercise and ingestion of a meal. The HPA axis will be studied in some detail by using two stressor paradigms and two steroid regimens. They expect to be able to detect subtle differences in HPA axis reactivity in obese individuals that might contribute to morbidity and perhaps even make individuals resistant to therapeutic interventions. So far they have enrolled 160 participants. Of those, 123 subjects have completed the study and 4 are in progress; 33 subjects have dropped out. Data collection and analyses are proceeding on schedule. Two abstracts were presented in 2006, one was presented in 2007, and one was submitted and accepted for presentation in the Summer of 2008. The authors are on schedule for all study milestones and look forward to being able to answer the important questions regarding the potential role of the HPA axis in obesity.
DTIC
Adrenal Gland; Africa; Endocrinology; Hypothalamus; Obesity; Physiology; Pituitary Gland; Pituitary Hormones; Races (Anthropology); Reactivity

20080041861 Michigan Univ., Ann Arbor, MI USA

Significance of Pathways Leading to RhoC Overexpression in Breast Cancer

Alford, Sharon H; Merajver, Sofia; Gruber, Stephen; Apr 2007; 6 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0395

Report No.(s): AD-A484269; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Tumor biology is a recognized determinant of tumor behavior, including growth rate, motility and metastatic potential, and therapeutic resistance. This project was funded to investigate the regulation and expression of an excellent marker for aggressive breast tumors: RhoC-GTPase. When overactive, RhoC transforms mammary epithelial cells into a highly motile and invasive phenotype. We hypothesize that RhoC overexpression may be regulated by the transcription factor NF-kappa B and that at the same time RhoC is overexpressed the tumor also acquires therapy resistance. The objective of this study is to utilize existing breast cancer cohorts with tumor tissue and treatment response data available to assess the correlation between NF-kappa B and RhoC, individually and in combination, to treatment response. The specific aims of the project are to determine 1) if RhoC and NF-kappa B are correlated; 2) if RhoC and NF-kappa B are associated, individually and in combination, with aggressive breast cancer; and 3) if NF-kappa B and RhoC are associated with therapy resistance.

DTIC

Breast; Cancer; Mammary Glands

20080041862 Health Research, Inc., Buffalo, NY USA

Molecular Mechanisms of Differential Effects of Calcitriol on Endothelial Cells Isolated from Prostate Tumor and Normal Microenvironment

Chung, Ivy; Oct 2006; 7 pp.; In English

Contract(s)/Grant(s): W81XWH-05-1-0568

Report No.(s): AD-A484270; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The focus of this project is to evaluate the effects of calcitriol (1,25-dihydroxycholecalciferol), the active form of vitamin D and/or dexamethasone on endothelial cells found in both tumor and non-tumor or normal microenvironments. Calcitriol has significant anti-tumor effects in LNCaP, PC-3, and MLL Dunning rat prostate models. Dexamethasone potentiates the antitumor effects of calcitriol. In mice, we have demonstrated that calcitriol s effect in vivo could contribute to its action on the endothelial cells (EC) found in the tumor (tumor-derived endothelial cells, TDEC). Preclinical data indicate that these effects were more profound in TDEC when compared to the endothelial cells isolated from matrigel plugs implanted in normal animals (matrigel-derived endothelial cells, MDEC). The differential effects observed could be due to differences in the availability of vitamin D receptor (VDR) to interact with the transcription machinery.

DTIC

Calciferol; Cancer; Prostate Gland; Tumors

20080041863 Rochester Univ., NY USA

Properties of Leukemia Stem Cells in a Novel Model of Cml Progression to Lymphoid Blast Crisis

Jordan, Craig T; Oct 2007; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0608

Report No.(s): AD-A484271; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The objective of the study was to employ a novel mouse model of CML blast crisis to characterize various forms of leukemia stem cells (LSC) and their relative properties. In particular, distinguishing how differing normal target cells contribute to disease pathogenesis was regarded as an important priority in establishing relative heterogeneity of LSC.

DTIC

Leukemias; Stem Cells

20080041864 Texas Univ., Houston, TX USA

The BESCT Lung Cancer Program (Biology, Education, Screening, Chemoprevention, and Treatment)

Hong, Waun K; Khuri, Fadlo R; Mar 2008; 77 pp.; In English

Contract(s)/Grant(s): DAMD17-01-1-0689

Report No.(s): AD-A484272; No Copyright; Avail.: Defense Technical Information Center (DTIC)

BESCT program aims to define molecular abnormalities contributing to lung cancer initiation and progression and to develop innovative therapeutic approaches for this cancer. Our specific aims are 1) to understand molecular alterations in lung

cancer, 2) to develop chemoprevention strategies for lung cancer, and 3) to implement experimental molecular therapeutic approaches for lung cancer treatment.
DTIC
Cancer; Education; Lungs

20080041868 Children's Hospital of Pittsburgh, Pittsburgh, PA USA
New Advanced Technology for Muscular Dystrophy
Huard, Johnny; Mar 2008; 132 pp.; In English
Contract(s)/Grant(s): W81XWH-05-1-0334
Report No.(s): AD-A484293; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Researchers continue to investigate whether gene transfer to skeletal muscle can enable both the production of proteins that might be therapeutic for muscle disorders and the systemic delivery of non-muscle proteins. Although the engineering of new mutant vectors has reduced the problems associated with viral cytotoxicity and immune rejection after gene transfer, the inability of most viral vectors to efficiently transduce mature muscle fibers continues to impede gene transfer to skeletal muscle. Results from our laboratory and others have shown that adenovirus (AV), retrovirus (RSV), and herpes simplex virus (HSV) vectors all can transduce neonatal mouse muscle efficiently; however, the muscle becomes largely resistant to viral transduction within a few days after birth. We have identified the primary barriers of viral gene transfer to mature skeletal muscle and have investigated methods by which to overcome these barriers. Among such approaches, the ex vivo technique constitutes the most efficient method for delivery of viral vectors (AV, RSV, and HSV) to mature skeletal muscle. In this project, we will investigate ex vivo gene transfer to the dystrophic skeletal muscle of mature mdx mice (which model Duchenne muscular dystrophy) by using isogenic muscle-derived cells (satellite cells or muscle-derived stem cells [MDSCs]) and retroviral vectors encoding for a functional human mini-dystrophin gene. We first will compare these 2 populations of muscle-derived cells-satellite cells and MDSCs-to identify which cell type serves as the more efficient gene delivery vehicle in mdx mice (Technical Objective 1). We then will evaluate whether restricting the transgene expression specifically to skeletal muscle fibers after ex vivo gene transfer influences the efficiency and long-term persistence of dystrophin expression in mdx muscles (Technical Objective 2).
DTIC
Diseases; Genes; Musculoskeletal System

20080041871 House Ear Inst., Los Angeles, CA USA
Neurofibromatosis Type 2 (NF2) Natural History Consortium
Slattery, William; Jan 2007; 11 pp.; In English
Contract(s)/Grant(s): DAMD17-01-1-0710
Report No.(s): AD-A484303; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Neurofibromatosis 2 (NF2) is an autosomal dominant disorder characterized by the development of multiple nervous system tumors. All subjects develop bilateral vestibular schwanomas that lead to deafness and death if untreated. Subjects also tend to develop multiple meningiomas and spinal tumors, which result in significant motor and sensory deficits if left untreated. In the past decade, great strides have been made in terms of radiographic diagnosis, surgical approaches to these tumors, and understanding of the molecular biology of NF2. Unfortunately, similar advances in the understanding of the natural history of these tumors, fundamental to the evaluation of treatments, have not yet been made. The purpose of this study was to define the growth rates and clinical course of tumors associated with NF2. We accomplished this goal through the following steps: 1. Developed an international consortium of clinical centers with expertise in NF2, further expanding the infrastructure developed in the Natural History of Vestibular Schwannomas in NF2 US Army grant. All subjects were evaluated at local centers with full neurological, ophthalmological, radiographical, and audiometric evaluations and the data were sent to a centralized center for analysis. 2. Developed standardized volumetric analysis of intracranial and spinal tumors. 3. Formed an infrastructure for use in future clinical trials. All NF2 subjects identified at clinical centers will be categorized as potential subjects for future clinical trials. 4. Examined molecular and clinical features which may predict tumor behavior. This study led to a better understanding of the natural history and clinical course of tumors associated with NF2. An understanding of the natural history is also fundamental to the determination of efficacy of future medical or surgical therapies.
DTIC
Clinical Medicine; Organizations; Vestibules

20080041879 British Columbia Univ., Vancouver, British Columbia Canada

Study of Combination Neoadjuvant Hormone Therapy and Weekly OGX-011 (Clusterin Antisense Oligonulceotide) Prior to Radical Prostatectomy in Patients with Localized Prostate Cancer. Phase 1 and 2

Chi, Kim N; Aug 2007; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-1-0226

Report No.(s): AD-A484313; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The clusterin gene encodes a cytoprotective chaperone protein that promotes cell survival. Clusterin is expressed in a variety of cancers including prostate, increases in response to apoptotic stimuli, and confers a resistant phenotype. OGX-011 is a 2nd generation antisense complimentary to clusterin mRNA that inhibits expression of clusterin in xenograft models and thereby increases sensitivity to therapy. To evaluate OGX-011 as a potential treatment in humans, we have undertaken this Phase I/II study to evaluate the clinical, pathologic and biologic effects of OGX-011, in combination with neoadjuvant hormone therapy (NHT) in patients with prostate cancer and high risk features prior to radical prostatectomy. The primary objective of the phase I study was to determine phase II dose based on target regulation effect. The phase II component of this trial will assess the effects of combined NHT and OGX-011 on pathologic complete response. Progress: 25 patients were enrolled to 6 cohorts with doses of OGX-011 up to 640mg delivered. Toxicity was limited to grade 1/2, including fevers, rigors, fatigue and transient AST and ALT elevations and no dose-limiting toxicities. Plasma PK analysis showed dose proportional increases in AUC and Cmax with a t1/2 of approximately 2h. Prostate tissue concentrations of OGX-011 increased with dose, and tissue concentrations associated with preclinical effect could be achieved. Dose dependent decreases in prostate cancer cell clusterin expression were observed by QRT-PCR and immunohistochemistry (IHC). At 640mg dosing, clusterin mRNA was decreased to a mean of 8% (SD=4%) compared with lower dose levels and historical controls as assessed by QRT-PCR on laser captured microdissected cancer cells.

DTIC

Cancer; Hormones; Oligonucleotides; Patients; Pharmacology; Prostate Gland; Radicals; Therapy

20080041881 Emory Univ., Atlanta, GA USA

Harnessing Technology for Evidence Based Education and Training in Minimally Invasive Surgery. Addendum

Smith, C D; Oct 2006; 8 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0765

Report No.(s): AD-A484317; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Training specific surgical skills on simulators has been proven to bring a better-prepared student to a human operating room, and when the simulator-trained student performs a portion of a procedure fewer errors are made when compared to a learner who has not been trained on a simulator. This current study seeks to further this work by first developing a curriculum for training an entire procedure, laparoscopic cholecystectomy, using simulation technologies and integrating cognitive, psychomotor aspects of full procedure training, and second, to test the effectiveness of curriculum-based training through a multicenter, international research group, the MASTER group.

DTIC

Education; Surgery

20080041883 Michigan Univ., Ann Arbor, MI USA

Role of X-Linked Inhibitor of Apoptosis in Breast Cancer

Oetjen, Karolyn; Apr 2007; 6 pp.; In English

Contract(s)/Grant(s): W81XWH-06-1-0429

Report No.(s): AD-A484320; No Copyright; Avail.: Defense Technical Information Center (DTIC)

XIAP is an exciting potential target for breast cancer therapeutics but the specific functions of XIAP that contribute to breast cancer development or progression remain unknown. This project seeks to identify the properties of XIAP that play a crucial role in breast cancer using mutated XIAP molecules that are deficient in specific cellular functions in both in vitro and in vivo models of breast cancer. The tasks of the first phase of this project have been completed: establishing breast cancer cell lines deficient in XIAP or express only mutant forms of XIAP that can be used in models of anchorage-independent growth or tumor formation in immunocompromised mice. In the next phase of this project these cell lines will be evaluated to identify the role of XIAP in tumorigenesis which will be a valuable guide in the development of therapeutics that specifically target tumor-related functions of XIAP and in the advancement of our understanding of breast cancer biology.

DTIC

Apoptosis; Breast; Cancer; Inhibitors; Mammary Glands

20080041884 Texas Univ. Health Science Center, San Antonio, TX USA

The Role of Smad4 on Tumorigenesis, ERK Pathway, and SERM Resistance in Estrogen Receptor Alpha-Positive Breast Carcinoma Cells

Nichols, Robert; Sep 2007; 8 pp.; In English

Contract(s)/Grant(s): W81XWH-06-1-0693

Report No.(s): AD-A484322; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This pre-doctoral training award was for Robert Nichols a Ph.D. graduate student to determine the interaction among signaling pathways of TGF-beta/Smad4 ERK and estrogen in the regulation of breast carcinogenesis and resistance to selective estrogen receptor modulators. During the past year the PI established various breast cancer cell lines with modulated expression of Smad4 and performed some proposed experiments using the established cell lines. However the progress was significantly hindered after the PI was ordered to join National Guard for combat training two months after the award and was eventually deployed in Iraq in May 2007. The mentor Dr. LuZhe Sun was asked by the DOD Program to prepare this interim progress report in lieu of an annual report.

DTIC

Breast; Cancer; Estrogens; Mammary Glands; Tumors

20080041885 Duke Univ., Durham, NC USA

Novel Gbeta Mimic Kelch Proteins (Gpb1 and Gpb2 Connect G-Protein Signaling to Ras via Yeast Neurofibromin Homologs Ira1 and Ira2: A Model for Human NF1

Heitman, Joseph; Mar 1, 2008; 87 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0208

Report No.(s): AD-A484324; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Neurofibromatosis type 1 (NF1) gene encodes a large tumor suppressor protein, neurofibromin, which is a Ras GTPase-activating protein (RasGAP) activity. Although the NF1 gene was identified over a decade ago, the biological roles of neurofibromin in cellular processes remain unclear. Therefore it is crucial for therapy and developing new drugs for NF1 patients to elucidate how the RasGAP activity of neurofibromin is controlled. To achieve this goal, it is also important to identify regulatory elements for neurofibromin. We are investigating the molecular mechanisms by which the Ras GAP activity of the yeast neurofibromin homologs Ira1/2 is regulated as a model to understand human NF1. We have found that the kelch Gb subunit mimics Gpb1/2 interact with Ira1/2 and control the Ras GAP activity of Ira1/2. Here, we found that the Gpb1/2 proteins are localized to the cell membrane in a Gpa2 dependent manner and function at the cell membrane. Gpb1/2 bind to the C-terminus of Ira1/2 and stabilize the Ira1/2 proteins. Moreover we also identified a Gpb1/2 binding domain near the C-terminus of Ira1/2 (GBD) that is significantly conserved in neurofibromin homologs, including a human counterpart. Therefore, similar regulatory mechanisms might be conserved in evolution.

DTIC

Diseases; Genetics; Proteins; Yeast

20080041886 Minnesota Univ., Minneapolis, MN USA

Investigation of the Role of Breast Tumor Kinase (Brk) in ERK5 and p38-Mediated Breast Cancer Cell

Lofgren, Kristopher; Oct 2007; 22 pp.; In English

Contract(s)/Grant(s): W81XWH-06-1-0752

Report No.(s): AD-A484325; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Breast tumor kinase (Brk) a novel non-receptor protein tyrosine kinase cloned from a metastatic human breast tumor (1) is overexpressed in approximately two-thirds of human breast tumors but is absent from normal breast epithelial cells (2). Little is known about the role of Brk in breast cancer. Data from our lab has shown that shRNA knockdown of endogenous Brk in T47D breast cancer cells blocked ERK5 and p38 mitogen activated protein kinase (MAPK) activation in the presence of heregulin and EGF. Brk gene-silencing also induced T47D cell growth inhibition and reduced migration in Boyden chamber assays relative to control (non-specific shRNA) conditions. We have preliminarily shown that Brk kinase activity appears to be required for p38 MAPK and Erk5 phosphorylation and that Brk protein appears to have a long half-life. These results are preliminary but are beginning to approach areas of Brk related research that have not been addressed.

DTIC

Breast; Cancer; Enzymes; Mammary Glands; Phosphorus; Proteins; Tumors

20080041893 Maryland Univ., Baltimore, MD USA
Baltimore City Faith-Based Prostate Cancer Prevention and Control Coalition
Plowden, Keith O; Feb 2008; 6 pp.; In English
Contract(s)/Grant(s): W81XWH-04-1-0297
Report No.(s): AD-A484349; No Copyright; Avail.: Defense Technical Information Center (DTIC)

African American men are disproportionately affected by prostate cancer. In order to positively impact this disease, early interventions that encourage early detection and treatment are essential. The primary purpose of this study is to test an investigator developed community-based intervention that explores the impact of peer-outreach workers on prostate cancer knowledge, perceived benefit and barriers, and overall screening behavior. The target sample for this study will be Black men over age 40 who have never participated in prostate cancer screening. Achievement of this objective will result in an increase in prostate cancer knowledge, an increase in perceived benefit of prostate cancer screening and treatment; a decrease in perceived barrier to screening, and an increase in screening among men in the intervention group.
DTIC
Africa; Cancer; Prevention; Prostate Gland

20080041895 Hutchinson (Fred) Cancer Research Center, Seattle, WA USA
Development of Immortalized Cell Lines from Hereditary Prostate Cancer Families
Stanford, Janet; Ostrander, Elaine; Sep 2006; 6 pp.; In English
Contract(s)/Grant(s): W81XWH-04-1-0060
Report No.(s): AD-A484352; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Prostate cancer is a significant cause of morbidity and mortality in the USA. Several types of epidemiological studies confirm the existence of a genetic component to prostate cancer etiology. Hereditary prostate cancer (HPC) genes are predicted to account for about 43% of disease in men over 55, and 9% of total prostate cancer in men diagnosed through age 85. To best utilize the finite amount of DNA in blood samples previously collected from 271 HPC families, we are creating immortalized cell lines. The objective is to generate a long term resource of germline DNA from HPC families for use in mapping gene pathways associated with disease susceptibility.
DTIC
Cancer; Genetics; Prostate Gland

20080041896 Illinois Univ., Urbana, IL USA
Acquisition of Equipment for Research in Nanobiomedical Technologies
Adesida, Ilesanmi; Cunningham, Brian; Ahmad, Irfan; Saif, Taher; Bashir, Rashid; May 29, 2008; 16 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-07-1-0065
Report No.(s): AD-A484353; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The University of Illinois Center for Nanoscale Science and Technology (CNST) has been leading the way in facilitating research leading to the development of ultra-small, ultra-light, wirelessly-connected nano devices and materials for nanomedicine. Preliminary results from research conducted at the Micro and Nanotechnology Laboratory (MNTL) using some of the equipment purchased from AFOSR grant. The grant enabled University of Illinois to markedly transform the recently expanded MNTL from being primarily compound semiconductor and micro/nano electronics facility, to also being a state-of-the-art multidisciplinary bionanotechnology laboratory space. This has not only helped the laboratory in conducting cutting-edge research, but also has been used in training the next generation workforce in bionanotechnology addressing such issues as battlefield injuries, viruses, and cancer. It also has enabled the CNST and MNTL to leverage extra-mural funding. The florescent optical microscope (Olympus IX 81) was used to study cardiac cells cultured on substrates with varying stiffness. Equipment is being used for screening a small molecule compound library for drug molecules that have the capability for treating Parkinson's Disease.
DTIC
Laboratory Equipment; Medical Science; Nanotechnology

20080041897 Naval War Coll., Newport, RI USA
Regional Contagion: Social, Economic, Health and Population Crisis Diffusion
Passinault, Rob J; Apr 24, 2008; 29 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484358; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Since the fall of the Iron Curtain and subsequent governance vacuum, the globe has seen more instability than any time

in recent history. In this environment, multiple crises have escalated and diffused through spatial, temporal and population networks, like a contagion. Many times a crisis in one dimension, like population, may bleed into other dimensions such as the social, economic or health realms. Worse yet, these crises can escalate and lead to regional contagion by crossing borders. Evolving to this new world order, the U.S. national strategy and joint doctrine outline a need for conflict prediction and prevention along with interagency cooperation. Therefore, the operational commander must understand and anticipate the health, social, economic, and population interrelations, contagion and spillover effects of crisis. Using a simple contagion model developed from the health community, this work shows how a theater commander, the interagency and regional partners can assess, predict and possibly prevent crisis contagion, averting regional escalation. The model and methodology is applied to U.S. Southern Command, and uses Argentina, specifically, as a case study.
DTIC
Diffusion; Economics; Emergencies; Health; Management Methods; Medical Services; Military Operations; Populations

20080041903 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA
Fluoride Ion Regeneration of Cyclosarin (GF) From Rat Blood Following Whole-Body Exposure to Lethal Levels of GF Vapor
Jakubowski, E M; Anthony, J S; Mioduszewski, R J; Manthei, J H; Burnett, D C; Way, R A; Gaviola, B I; Scotto, J A; Muse, W T; Whalley, C E; Jul 1, 2003; 6 pp.; In English
Report No.(s): AD-A484392; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A sensitive and selective method has been developed for a cyclohexyl methylphosphonofluoridate (GF) nerve agent biomarker in tissue and biological fluids after GF lethal level whole body inhalation exposure. Levels of exposure ranged from 2 mg/m3 for 240 min to 41.9 mg/m3 for 10 min. The GF biomarker found in rat plasma and red blood cell samples was regenerated GF, which is the product of adding fluoride ion at pH 4 to the post exposure samples. Regenerated GF was separated from the biological matrix using a C18 solid-phase extraction (SPE) sample preparation. Samples are concentrated by injecting 2-200 uL of ethyl acetate extract on a Tenax -TA sorbent tube along with 200 pg of decadeuterated diethyl ethyl phosphonate as the internal standard followed by thermal desorption GC-FPD analysis and GC-MS confirmation. The method detection limit was approximately 10 pg of agent on column. Quantities of regenerated GF found in plasma samples ranged from 230 to 572 ng/g. Red blood cell samples from the same animals contained considerably less biomarker ranging from 1.45 to 30.0 ng/g. In cases where animals died just after the exposure was complete and post mortem blood could be collected the levels of regenerated GF in both plasma and red blood cells were only 60 % of the amount found in the living rats.
DTIC
Animals; Blood; Blood Volume; Erythrocytes; Exposure; Fluorides; Irradiation; Lethality; Nerves; Rats; Toxicology; Vapors

52
AEROSPACE MEDICINE

Includes the biological and physiological effects of atmospheric and space flight (weightlessness, space radiation, acceleration, and altitude stress) on the human being; and the prevention of adverse effects on those environments. For psychological and behavioral effects of aerospace environments, see *53 Behavioral Sciences*. For the effects of space on animals and plants see *51 Life Sciences*.

20080040805 NASA Johnson Space Center, Houston, TX, USA
Using Latent Sleepiness to Compare Two Tests of Cognitive Performance
Fiedler, James; Feiveson, Alan H.; Hayat, Matthew J.; Vaksman, Zalman; Boyd, L.; Putcha, Lakshmi; [2008]; 11 pp.; In English; Original contains black and white illustrations; Copyright; Avail.: Other Sources

In a NASA ground study, two forms of cognitive tests were evaluated in terms of their sensitivity to sleepiness induced by the drug promethazine (PMZ). Performance for the two test modes (Y1 and Y2), PMZ concentration, and a self-reported sleepiness using the Karolinska Sleepiness Scale (KSS) were monitored for 72 hours post dose. A problem arises when using KSS to establish an association between true sleepiness and performance because KSS scores are discrete and because responses tend to concentrate on certain values. Therefore, we define a latent sleepiness measure X as an unobserved continuous random variable describing a subject s actual state of sleepiness. Under the assumption that drug concentration affects X, which then affects Y1, Y2, and KSS, we estimate joint equations which permit unbiased comparison of the performance measures sensitivity to X.
Author
Motion Sickness; Drugs; Sleep; Cognition; Mental Performance; Astronaut Performance; Aerospace Medicine; Bioastronautics; Promethazine

20080040875 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Accessing and Utilizing Remote Sensing Data for Vectorborne Infectious Diseases Surveillance and Modeling

Kiang, Richard; Adimi, Farida; Kempler, Steven; March 16, 2008; 2 pp.; In English; The International Conference on Emerging Infectious Diseases (ICEID 2008), 16 - 19 Mar. 2008, Atlanta, Georgia, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: A01, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080040875

Background: The transmission of vectorborne infectious diseases is often influenced by environmental, meteorological and climatic parameters, because the vector life cycle depends on these factors. For example, the geophysical parameters relevant to malaria transmission include precipitation, surface temperature, humidity, elevation, and vegetation type. Because these parameters are routinely measured by satellites, remote sensing is an important technological tool for predicting, preventing, and containing a number of vectorborne infectious diseases, such as malaria, dengue, West Nile virus, etc. Methods: A variety of NASA remote sensing data can be used for modeling vectorborne infectious disease transmission. We will discuss both the well known and less known remote sensing data, including Landsat, AVHRR (Advanced Very High Resolution Radiometer), MODIS (Moderate Resolution Imaging Spectroradiometer), TRMM (Tropical Rainfall Measuring Mission), ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer), EO-1 (Earth Observing One) ALI (Advanced Land Imager), and SIESIP (Seasonal to Interannual Earth Science Information Partner) dataset. Giovanni is a Web-based application developed by the NASA Goddard Earth Sciences Data and Information Services Center. It provides a simple and intuitive way to visualize, analyze, and access vast amounts of Earth science remote sensing data. After remote sensing data is obtained, a variety of techniques, including generalized linear models and artificial intelligence oriented methods, t 3 can be used to model the dependency of disease transmission on these parameters. Results: The processes of accessing, visualizing and utilizing precipitation data using Giovanni, and acquiring other data at additional websites are illustrated. Malaria incidence time series for some parts of Thailand and Indonesia are used to demonstrate that malaria incidences are reasonably well modeled with generalized linear models and artificial intelligence based techniques. Conclusions: Remote sensing data relevant to the transmission of vectorborne infectious diseases can be conveniently accessed at NASA and some other websites. These data are useful for vectorborne infectious disease surveillance and modeling.

Derived from text

Infectious Diseases; Meteorological Parameters; Surface Temperature; Precipitation; Humidity; Elevation; Vegetation; Advanced Very High Resolution Radiometer; TRMM Satellite; Remote Sensing

20080042383 NASA Johnson Space Center, Houston, TX, USA

Effects of Frequency and Motion Paradigm on Perception of Tilt and Translation During Periodic Linear Acceleration

Beaton, K. H.; Holly, J. E.; Clement, G. R.; Wood, Scott J.; [2009]; 1 pp.; In English; Association for Research in Otolaryngology 32nd, 14-19 Feb. 2009, Baltimore, MD, USA

Contract(s)/Grant(s): NCC9-58; NIH R15 DC8311; Copyright; Avail.: Other Sources; Abstract Only

Previous studies have demonstrated an effect of frequency on the gain of tilt and translation perception. Results from different motion paradigms are often combined to extend the stimulus frequency range. For example, Off-Vertical Axis Rotation (OVAR) and Variable Radius Centrifugation (VRC) are useful to test low frequencies of linear acceleration at amplitudes that would require impractical sled lengths. The purpose of this study was to compare roll-tilt and lateral translation motion perception in 12 healthy subjects across four paradigms: OVAR, VRC, sled translation and rotation about an earth-horizontal axis. Subjects were oscillated in darkness at six frequencies from 0.01875 to 0.6 Hz (peak acceleration equivalent to 10 deg, less for sled motion below 0.15 Hz). Subjects verbally described the amplitude of perceived tilt and translation, and used a joystick to indicate the direction of motion. Consistent with previous reports, tilt perception gain decreased as a function of stimulus frequency in the motion paradigms without concordant canal tilt cues (OVAR, VRC and Sled). Translation perception gain was negligible at low stimulus frequencies and increased at higher frequencies. There were no significant differences between the phase of tilt and translation, nor did the phase significantly vary across stimulus frequency. There were differences in perception gain across the different paradigms. Paradigms that included actual tilt stimuli had the larger tilt gains, and paradigms that included actual translation stimuli had larger translation gains. In addition, the frequency at which there was a crossover of tilt and translation gains appeared to vary across motion paradigm between 0.15 and 0.3 Hz. Since the linear acceleration in the head lateral plane was equivalent across paradigms, differences in gain may be attributable to the presence of linear accelerations in orthogonal directions and/or cognitive aspects based on the expected motion paths.

Author

Motion Perception; Attitude (Inclination); Rotation; Translating; Earth Axis; Frequency Ranges; Linear Accelerators

20080042385 NASA Johnson Space Center, Houston, TX, USA

Latent Herpes Viruses Reactivation in Astronauts

Mehta, Satish K.; Pierson, Duane L.; [2008]; 16 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): NGT5-1666; 111-30-10-03; 111-30-10-06; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080042385

Space flight has many adverse effects on human physiology. Changes in multiple systems, including the cardiovascular, musculoskeletal, neurovestibular, endocrine, and immune systems have occurred (12, 32, 38, 39). Alterations in drug pharmacokinetics and pharmacodynamics (12), nutritional needs (31), renal stone formation (40), and microbial flora (2) have also been reported. Evidence suggests that the magnitude of some changes may increase with time in space. A variety of changes in immunity have been reported during both short (.16 days) and long (>30 days) space missions. However, it is difficult to determine the medical significance of these immunological changes in astronauts. Astronauts are in excellent health and in superb physical condition. Illnesses in astronauts during space flight are not common, are generally mild, and rarely affect mission objectives. In an attempt to clarify this issue, we identified the latent herpes viruses as medically important indicators of the effects of space flight on immunity. This chapter demonstrates that space flight leads to asymptomatic reactivation of latent herpes viruses, and proposes that this results from marked changes in neuroendocrine function and immunity caused by the inherent stressfullness of human space flight. Astronauts experience uniquely stressful environments during space flight. Potential stressors include confinement in an unfamiliar, crowded environment, isolation, separation from family, anxiety, fear, sleep deprivation, psychosocial issues, physical exertion, noise, variable acceleration forces, increased radiation, and others. Many of these are intermittent and variable in duration and intensity, but variable gravity forces (including transitions from launch acceleration to microgravity and from microgravity to planetary gravity) and variable radiation levels are part of each mission and contribute to a stressful environment that cannot be duplicated on Earth. Radiation outside the Earth's magnetosphere is particularly worrisome because it includes ionizing radiation from cosmic galactic radiation. Increased stress levels appear even before flight, presumably from the rigors of preflight training and the anticipation of the mission (12, 32, 38, 39). Space flight causes significant changes in human immune function (32), but the means by which these changes come about have been difficult to discern. Consistent indicators of stress associated with space flight include increased production of stress hormones, and changes in cells of the immune system. These changes include elevated white blood cell (WBC) and neutrophil counts at landing (15, 16, 35, 37). Activation of generalized stress responses before, during, and after space flight probably affects the function of the immune system. Space flight has been shown to decrease many aspects of immune function, including natural killer (NK) cell activity, interferon production, the blastogenic response of leukocytes to mitogens, cell-mediated immunity, neutrophil function and monocyte function (5, 16, 18, 21, 35-37).
Derived from text

Cardiovascular System; Neurophysiology; Musculoskeletal System; Endocrine Systems; Immune Systems; Space Flight; Space Missions; Planetary Radiation; Microgravity; Galactic Radiation; Effects; Radiation Effects; Astronauts

20080042386 NASA Johnson Space Center, Houston, TX, USA

Effects of Learning on Performance When Computerized Dynamic Posturography Assessments Are Repeated

Taylor, Laura C.; Paloski, William H.; Wood, Scott J.; [2008]; 1 pp.; In English; 80th Annual Scientific Meeting of the Aerospace, 3-7 May 2009, Los Angeles, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

Background: Computerized dynamic posturography is widely used to measure balance control performance. Clinically, performance is assessed by comparing individual data against standards obtained from a normative population. When performing repeated assessments to track performance changes, one must be concerned with the influence of learning effects. Subjects do not have the opportunity to practice before the first session, and often a second session is not performed prior to an experiment. Thus, the objective of this activity was to examine learning effects on balance control performance. We hypothesize that subjects will perform better on the second session when compared to the first, and that the difference will be greater for more difficult conditions. Methods: Data were collected from 204 subjects using the NeuroCom Equitest system during quiet stance with arms crossed at the chest on up to two sessions. All subjects performed standard sensory organization tests (SOTs) including 1) normal vision, fixed support; 2) absent vision, fixed support; 3) sway-referenced vision, fixed support; 4) normal vision, swayreferenced support; 5) absent vision, sway-referenced support; and 6) sway-referenced vision, sway-referenced support. 120 of these subjects performed modified sensory organization tests (mSOTs 2 and 5) which included static (20 back) and dynamic (20, 0.33Hz) head tilts. Median equilibrium scores (mEQ) were calculated from peak-to-peak anterior-posterior sway across trials. Data collected on the first session were then compared with the second to examine learning effect. Results: There were no differences in mEQ scores between the first and second sessions for SOTs 1, 2, and 4, while mEQ scores were higher for the second session when compared to the first for SOTs 3, 5, and 6 and for all

mSOTs. Discussion: An additional familiarization session or practice trials prior to the first session may be necessary for more challenging SOT and mSOT conditions to minimize learning effect.
Author
Solar Optical Telescope; Posture; Equilibrium; Balance

20080042387 NASA Johnson Space Center, Houston, TX, USA
Space Human Factors: Research to Application
Woolford, Barbara; October 21, 2008; 43 pp.; In English; 3rd IAASS Conference, 21-23 Oct. 2008, Rome, Italy; Original contains color illustrations; Copyright; Avail.: CASI: A03, Hardcopy

Human Factors has been instrumental in preventing potential on-orbit hazards and increasing overall crew safety. Poor performance & operational learning curves on-orbit are mitigated. Human-centered design is applied to optimize design and minimize potentially hazardous conditions, especially with larger crew sizes and habitat constraints. Lunar and Mars requirements and design developments are enhanced, based on ISS Lessons Learned.
Derived from text
Human Factors Engineering; Safety Factors; Space Flight Stress; Learning Curves; Hazards; Habitats; Spacecrews

53
BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

20080040948 State Univ. - Higher School of Economics, Moscow, Russia
Environmental Theory of Mentality
Skopin, A. J.; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 12 pp.; In English; See also 20080040944; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Definition of mentality--Environmental (cultural-logic) and psychological theories of mentality. It includes structure of an environment and formation of mentality. Structure of mentality includes the types of mentality and the form of spiritual culture. We discuss herein the hypothetical consequences from the environmental theory of mentality (a difference between men's and women's mentality, a difference between the European, Asian and Russian mentality, a difference between elite and egalitarian mentality, a difference of age mentality). Sociological check of hypotheses.
Derived from text
Psychological Factors; Culture (Social Sciences); Anthropology; Mental Performance

20080041534 NASA Johnson Space Center, Houston, TX, USA
Integrating Space Flight Resource Management Skills into Technical Lessons for International Space Station Flight Controller Training
Baldwin, Evelyn; October 21, 2008; 18 pp.; In English; 3rd IAASS Conference 'Building, Together, a Safer Space', 21-23 Oct. 2008, Rome, Italy; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041534

The Johnson Space Center s (JSC) International Space Station (ISS) Space Flight Resource Management (SFRM) training program is designed to teach the team skills required to be an effective flight controller. It was adapted from the SFRM training given to Shuttle flight controllers to fit the needs of a '24 hours a day/365 days a year' flight controller. More recently, the length reduction of technical training flows for ISS flight controllers impacted the number of opportunities for fully integrated team scenario based training, where most SFRM training occurred. Thus, the ISS SFRM training program is evolving yet again, using a new approach of teaching and evaluating SFRM alongside of technical materials. Because there are very few models in other industries that have successfully tied team and technical skills together, challenges are arising. Despite this, the Mission Operations Directorate of NASA s JSC is committed to implementing this integrated training approach because of the anticipated benefits.
Author
Flight Control; Flight Management Systems; International Space Station; Resources Management; Education

20080041602 NASA Johnson Space Center, Houston, TX, USA

Comparison of Computerized Sway Referencing and Standing on a Compliant Surface

Dean, S. Lance; Paloski, William H.; Wood, Scott J.; [2009]; 1 pp.; In English; 80th Annual Scientific Meeting of the Aerospace Medical Association, 3-7 May 2009, Los Angeles, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

Background: By removing vision and altering somatosensory inputs, we can examine the contributions of the vestibular system on balance control. Computerized Dynamic Posturography (CDP) systems accomplish this by using a dynamic plate that moves in proportion to the sway of the subject. A potential alternative to CDP is the use of a compliant foam surface. The goal of this study was to compare postural sway during each condition. Methods: Thirty-two healthy subjects (16 male and 16 female) were tested on a Equitest computerized posturography system and on a 5 inch thick block of foam (NeuroCom International; Clackamas, OR). Subjects performed three trials with their head erect and five trials with dynamic head tilts (20 at 0.33Hz) in the anterior-posterior (AP) plane. Subjects were instructed to stand quietly with their arms folded and eyes closed for each trial lasting 20 seconds. The sway in both AP and medial-lateral (ML) planes was calculated for each trial, as well as the total sway path length. Results: In general, AP sway tended to be greater on the Equitest than on foam and greater during the head movement trials than the head erect. The ML sway was consistently higher on foam and did not vary between head erect and moving conditions. Sway path length was consistently greater for head erect trials on foam and tended to be greater for head movement trials on the Equitest. The addition of head movements increases AP sway and the total path length. Conclusions: Based on the increase of sway in the ML direction, it is important to quantify sway in all directions when on a compliant foam surface.

Author

Sensory Perception; Elastic Properties; Head Movement; Computer Techniques

20080042401 NASA Johnson Space Center, Houston, TX, USA

Refinement of Optimal Work Envelope for Extra-Vehicular Activity (EVA) Suit Operations

Jaramillo, Marcos A.; Angermiller, Bonnie L.; Morency, Richard M.; Rajululu, Sudhakar L.; September 2008; 28 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): 410.02.01.02.13.0718; Copyright; Avail.: CASI: A03, Hardcopy

The purpose of the Extravehicular Mobility Unit (EMU) Work Envelope study is to determine and revise the work envelope defined in NSTS 07700 'System Description and Design Data - Extravehicular Activities' [1], arising from an action item as a result of the Shoulder Injury Tiger Team findings. The aim of this study is to determine a common work envelope that will encompass a majority of the crew population while minimizing the possibility of shoulder and upper arm injuries. There will be approximately two phases of testing: arm sweep analysis to be performed in the Anthropometry and Biomechanics Facility (ABF), and torso lean testing to be performed on the Precision Air Bearing Facility (PABF). NSTS 07700 defines the preferred work envelope arm reach in terms of maximum reach, and defines the preferred work envelope torso flexibility of a crewmember to be a net 45 degree backwards lean [1]. This test served two functions: to investigate the validity of the standard discussed in NSTS 07700, and to provide recommendations to update this standard if necessary.

Derived from text

Extravehicular Mobility Units; Biodynamics; Injuries; Anthropometry; Torso; Shoulders; Extravehicular Activity

54
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human factors engineering, bionics, man-machine systems, life support, space suits and protective clothing. For related information see also *16 Space Transportation and Safety* and *52 Aerospace Medicine*.

20080040813 Rocky Mountain Research Station, Fort Collins, CO, USA

Using Social Science to Understand and Improve Wildland Fire Organizations: An Annotated Reading List

Larson, G.; Wright, V.; Spaulding, C.; Rossetto, K.; Rausch, G.; Sep. 2007; 92 pp.; In English

Report No.(s): PB2008-103426; FSGTR-RMRS-201; No Copyright; Avail.: CASI: A05, Hardcopy

The wildland fire community has spent the past decade trying to understand and account for the role of human factors in wildland fire organizations. Social research that is relevant to managing fire organizations can be found in disciplines such as social psychology, management, and communication. However, such research has been published primarily for scientific and business audiences, and much of the fire community has not been exposed to it. Here, we have compiled and organized knowledge from a variety of social science disciplines so that it can be used to improve organizational practices related to firefighter and public safety, to assess the effectiveness of safety campaigns, and to improve firefighter safety trainings. This

annotated reading list summarizes approximately 270 books, articles, and online resources that address scientific and management concepts helpful for understanding the human side of fire management. The first section, Human Factors and Firefighting, introduces readers to key workshops and writings that led to the recognition that human factors are prime ingredients of firefighter safety. The second section, Foundations for Understanding Organizations, consists of social science research that provides a foundation for understanding organizational dynamics. This section includes readings on decision making and sensemaking, organizational culture, identification and identity, leadership and change, organizational learning, and teams and crews. The third section, Understanding Organizations in High Risk Contexts, explores organizations that deal regularly with risk, uncertainty and crisis. This section includes readings on risk and uncertainty, high reliability organizing, and crisis communication. The publication concludes with Internet resources available for those interested in the management of fire organizations.
NTIS
Annotations; Bibliographies; Decision Making; Fires; Leadership; Lists; Organizations; Reliability; Sociology

20080040907 Second Sight Medical Products, Inc., Sylmar, CA, USA
Retinal Prosthesis (PAT-APPL-10-918 112)
Greenberg, R., Inventor; Talbot, N., Inventor; Mech, B. V., Inventor; Little, J., Inventor; 13 Aug 04; 16 pp.; In English
Contract(s)/Grant(s): R24EY12893-01
Patent Info.: Filed Filed 13 Aug 04; US-Patent-Appl-SN-10-918 112
Report No.(s): PB2008-104342; No Copyright; Avail.: CASI: A03, Hardcopy
The invention is a retinal prosthesis with an improved configuration mounting necessary components within and surrounding the eye. The present invention better allows for the implantation of electronics within the delicate eye structure. The invention further limits the necessary width of a thin film conductor passing through the sclera by use of a multiplexer external to the sclera and a demultiplexer internal to the sclera.
NTIS
Mounting; Patent Applications; Retina; Prosthetic Devices

20080041471 Idaho National Lab., Idaho Falls, ID, USA
Modeling and Simulation Approaches to Developing Human Performance Measures in Nuclear Industry
Hallbert, B. P.; Joe, J. C.; Keefe, M. J.; Persensky, J. J.; Aug. 2007; 6 pp.; In English
Report No.(s): DE2007-918173; INL/CON-07-12761; No Copyright; Avail.: Department of Energy Information Bridge
Human performance is a key component to the safe operation of nuclear power plants. Further, human performance is quite variable, and while some variability may be random, much of it may be attributed to factors that are difficult to assess. There is a need to identify and assess aspects of human performance that relate to plant safety and to develop measures that can be used to successfully assess human performance for purposes of research that can lead to technical basis for developing human factors review criteria.
NTIS
Human Performance; Industries; Nuclear Power Plants; Simulation

20080041626 Lumidigm, Inc., Albuquerque, NM USA
Army SBIR, Interim Funding Final Report on Contract W911NF-07-C-0022 (Lumidigm, Inc.)
Rowe, Robert; Sep 30, 2007; 7 pp.; In English
Contract(s)/Grant(s): W911NF-07-C-0022
Report No.(s): AD-A483806; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483806
The major objective during this performance period was to collect a set of whole-hand data on a significantly larger population of volunteers than collected during Phase I of this program. This expanded dataset will be used to further develop and refine whole hand processing algorithms. The larger data set will also provide statistically stronger results. These results will be incorporated into a paper that will be presented and published in the proceedings of the upcoming Biometric Symposium in Baltimore, MD. Forty additional volunteers were recruited and measured with the prototype whole-hand imaging system using the same protocol as used for the 10 volunteers that made up the original dataset. Specifically, each

volunteer made two measurement visits separated by at least one day. During each visit, each of the volunteer's hands was measured three times. When the data from the 40 new people were combined with the earlier 10, the resulting dataset contained a total of 600 measurements of 100 unique hands. The full data set comprised data taken on 21 females and 29 males. The age range of the volunteers was 24-70 years old. The volunteers were of mixed ethnicities and demographic profiles.
DTIC
Biometrics; Demography; Measurement

20080041796 Army Research Inst. of Environmental Medicine, Natick, MA USA
Thermal Comfort and Sensation in Men Wearing a Cooling System Controlled by Skin Temperature
Vernieuw, Carrie R; Stephenson, Lou A; Kolka, Margaret A; Jul 2007; 13 pp.; In English
Report No.(s): AD-A484112; USARIEM/TMMD-M06-23; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The study was done to determine whether thermal comfort (TC), thermal sensation (TS), and subjective factors gauging environmental stress were negatively affected with different cooling methods in men exercising in chemical protective clothing. Background: Previous studies have reported that intermittent regional cooling improved the efficacy of cooling as compared with constant cooling (CC), but no studies have addressed whether there is any improvement in thermal comfort. Methods: Eight male volunteers exercised at moderate work intensity (425 W) in three microclimate cooling tests. The circulating fluid in the cooling garment was provided during exercise to the head (6% body surface area [BSA]), torso (22% BSA), and thighs (44% BSA) and manipulated under three methods: (a) CC, (b) pulsed cooling (PC), and (c) PC activated by mean skin temperature (Tsk) control (PCskin). TC and TS ratings were recorded every 20 min during the 80-min test. Results: TC and TS ratings were not different for PC skin and CC; thus the participants perceived PCskin as being similar to CC. TS were significantly warmer with PC than with PCskin and CC ($p < .001$), and PCskin was rated as being not as warm as PC according to TS. Conclusion: This indicates that the PCskin method was perceived as being as cool as CC and cooler than PC. Application: These findings indicate that the PCskin cooling method is an acceptable alternative to CC and PC based on human perceptions.
DTIC
Cooling Systems; Human Beings; Liquid Cooling; Males; Protective Clothing; Temperature Control; Thermal Comfort

20080042185 Air Force Research Lab., Wright-Patterson AFB, OH USA
Human System Integration Support Tools with Links to DoD System Acquisition Phases
Laux, Lila; Small, Ronald L; Archer, Susan G; Martin, Edward A; Mar 2008; 95 pp.; In English
Contract(s)/Grant(s): MIPR-F4FBFW5259G001; Proj-7184
Report No.(s): AD-A483793; AFRL-RH-WP-SR-2008-0002; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483793

This report is designed to help proceduralize the human-systems integration (HSI) process by linking the flow of HSI analyses in the systems acquisition process to tools that can support those analyses. The initial sections of this report describe how this report is intended to be used, define acquisition-process and HSI terminology, and provide some HSI metrics. All HSI domains are explicitly addressed with the exception of habitability. Techniques for confirming that HSI requirements have been satisfied are also addressed. The following are included in tabular form with links that reflect the flow of analyses as HSI is integrated within the system acquisition process: * The DoD acquisition process and milestones * The acquisition phases and associated HSI activities * Tool categories for responding to different HSI questions * Detailed information about specific HSI tools including: (1) a description of the tool, (2) the tool inputs, (3) the tool outputs, (4) specific HSI metrics the tool supports, and (5) a rough estimate of the level of effort expected to use the tool.
DTIC
Human Factors Engineering; Systems Integration

55
EXOBIOLOGY

Includes astrobiology; planetary biology; and extraterrestrial life. For the biological effects of aerospace environments on humans see *52 Aerospace Medicine*; on animals and plants see *51 Life Sciences*. For psychological and behavioral effects of aerospace environments see *53 Behavioral Sciences*.

20080040865 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Nanoflow Separation of Amino Acids for the Analysis of Cosmic Dust

Martin, M. P.; Glavin, D. P.; Dworkin, Jason P.; March 10, 2008; 2 pp.; In English; LPSC Conference, 10-14 Mar. 2008, Houston, TX, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The delivery of amino acids to the early Earth by interplanetary dust particles, comets, and carbonaceous meteorites could have been a significant source of the early Earth's prebiotic organic inventory. Amino acids are central to modern terrestrial biochemistry as major components of proteins and enzymes and were probably vital in the origin of life. A variety of amino acids have been detected in the CM carbonaceous meteorite Murchison, many of which are exceptionally rare in the terrestrial biosphere including a-aminoisobutyric acid (AIB) and isovaline. AIB has also been detected in a small percentage of Antarctic micrometeorite grains believed to be related to the CM meteorites We report on progress in optimizing a nanoflow liquid chromatography separation system with dual detection via laser-induced-fluorescence time of flight mass spectrometry (nLC-LIF/ToF-MS) for the analysis of o-phthaldialdehydelN-acetyl-L-cysteine (OPA/NAC) labeled amino acids in cosmic dust grains. The very low flow rates (<3 micro-L/min) of nLC over analytical LC (>0.1 ml/min) combined with <2 micron column bead sizes has the potential to produce efficient analyte ionizations andchromatograms with very sharp peaks; both increase sensitivity. The combination of the selectivity (only primary amines are derivatized), sensitivity (>4 orders of magnitude lower than traditional GC-MS techniques), and specificity (compounds identities are determined by both retention time and exact mass) makes this a compelling technique. However, the development of an analytical method to achieve separation of compounds as structurally similar as amino acid monomers and produce the sharp peaks required for maximum sensitivity is challenging.

Derived from text

Amino Acids; Biochemistry; Biological Evolution; Carbonaceous Meteorites; Cosmic Dust; Interplanetary Dust; Micrometeorites; Extraterrestrial Life

59
MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

Includes general topics and overviews related to mathematics and computer science. For specific topics in these areas see *categories 60 through 67*.

20080040811 National Inst. of Standards and Technology, Gaithersburg, MD, USA

User's Guide to Securing External Devices for Telework and Remote Access. Recommendations of the National Institute of Standards and Technology

Scarfone, K.; Souppaya, M.; Nov. 2007; 46 pp.; In English

Report No.(s): PB2008-103430; NIST/SP-800-114; No Copyright; Avail.: CASI: A03, Hardcopy

Many people telework (also known as telecommuting), which is the ability for an organizations employees and contractors to conduct work from locations other than the organizations facilities. Teleworkers use various devices, such as desktop and laptop computers, cell phones, and personal digital assistants (PDA), to read and send email, access Web sites, review and edit documents, and perform many other tasks. Most teleworkers use remote access, which is the ability of an organizations users to access its nonpublic computing resources from locations other than the organizations facilities. Organizations have many options for providing remote access, including virtual private networks, remote system control, and individual application access (e.g., Web-based email).

NTIS

Computer Information Security; Telecommunication; Personal Computers; Electronic Mail

20080040812 National Inst. of Standards and Technology, Gaithersburg, MD, USA

Guide to Storage Encryption Technologies for End User Devices. Recommendations of the National Institute of Standards and Technology

Scarfone, K.; Souppaya, M.; Sexton, M.; Nov. 2007; 40 pp.; In English

Report No.(s): PB2008-103429; NIST/SP-800-111; No Copyright; Avail.: CASI: A03, Hardcopy

In todays computing environment, there are many threats to the confidentiality of information stored on end user devices,

such as personal computers, consumer devices (e.g., personal digital assistant, smart phone), and removable storage media (e.g., universal serial bus (USB) flash drive, memory card, external hard drive, writeable CD or DVD). Some threats are unintentional, such as human error, while others are intentional. Intentional threats are posed by people with many different motivations, including causing mischief and disruption and committing identity theft and other fraud. A common threat against end user devices is device loss or theft. Someone with physical access to a device has many options for attempting to view or copy the information stored on the device. Another concern is insider attacks, such as an employee attempting to access sensitive information stored on another employees device. Malware, another common threat, can give attackers unauthorized access to a device, transfer information from the device to an attackers system, and perform other actions that jeopardize the confidentiality of the information on a device.
NTIS
Computer Information Security; Cryptography

20080040893 Bureau of the Census, Washington, DC, USA
Economic Census 1997: Professional, Scientific, and Technical Services. Subject Series. Summary
Apr. 2001; 82 pp.; In English
Report No.(s): PB2008-104024; EC97S54S-SM; No Copyright; Avail.: CASI: A05, Hardcopy

The Professional, Scientific, and Technical Services sector (sector 54) of the 1997 Economic Census covers establishments with payroll that specialize in performing professional, scientific, and technical activities for others. These activities require a high degree of expertise and training. The establishments in this sector specialize according to expertise and provide services to clients in a variety of industries and, in some cases, to households. Activities performed include: legal advice and representation; accounting, bookkeeping, and payroll services; architectural, engineering, and specialized design services; computer services; consulting services; research services; advertising services; photographic services; translation and interpretation services; veterinary services; and other professional, scientific, and technical services. This sector excludes establishments primarily engaged in providing a range of day-to-day office administrative services, such as financial planning, billing and recordkeeping, personnel, and physical distribution and logistics. These establishments are classified in Sector 56, Administrative and Support and Waste Management and Remediation Services. Data for this sector are shown for establishments of firms subject to Federal income tax and separately of firms which are exempt from Federal income tax under provisions of the Internal Revenue Code. Many of the kinds of business or operation included in this sector are not thought of as commercial businesses and the terms (such as business, establishment, and firm) used to describe them may not be descriptive of such services. However, these terms are applied to all kinds of business or operation in order to maintain conformity in the measures of the production and delivery of goods and services and in the presentation of data. The basic tabulations for this sector do not include data for establishments which are auxiliary (primary function is providing a service, such as warehousing or bookkeeping) to service establishments within the same organization. Data for auxiliaries are presented separately.
NTIS
Census; Economic Analysis; Economics

20080040894 Bureau of the Census, Washington, DC, USA
Economic Census 1997: Professional, Scientific, and Technical Services. Subject Series. Miscellaneous Subjects
Apr. 2001; 310 pp.; In English
Report No.(s): PB2008-104023; EC97S54S-SB; No Copyright; Avail.: CASI: A14, Hardcopy

The Professional, Scientific, and Technical Services sector (sector 54) of the 1997 Economic Census covers establishments with payroll that specialize in performing professional, scientific, and technical activities for others. These activities require a high degree of expertise and training. The establishments in this sector specialize according to expertise and provide services to clients in a variety of industries and, in some cases, to households. Activities performed include: legal advice and representation; accounting, bookkeeping, and payroll services; architectural, engineering, and specialized design services; computer services; consulting services; research services; advertising services; photographic services; translation and interpretation services; veterinary services; and other professional, scientific, and technical services. This sector excludes establishments primarily engaged in providing a range of day-to-day office administrative services, such as financial planning, billing and recordkeeping, personnel, and physical distribution and logistics. These establishments are classified in Sector 56, Administrative and Support and Waste Management and Remediation Services. Data for this sector are shown for establishments of firms subject to Federal income tax and separately of firms which are exempt from Federal income tax under provisions of the Internal Revenue Code. Many of the kinds of business or operation included in this sector are not thought of as commercial businesses and the terms (such as business, establishment, and firm) used to describe them may not be

descriptive of such services. However, these terms are applied to all kinds of business or operation in order to maintain conformity in the measures of the production and delivery of goods and services and in the presentation of data. The basic tabulations for this sector do not include data for establishments which are auxiliary (primary function is providing a service, such as warehousing or bookkeeping) to service establishments within the same organization. Data for auxiliaries are presented separately.
NTIS
Census; Economic Analysis; Economics

20080040895 Bureau of the Census, Washington, DC, USA
Economic Census 1997: Professional, Scientific, and Technical Services. Subject Series. Sources of Receipts and Revenues
Aug. 2000; 66 pp.; In English
Report No.(s): PB2008-104022; EC97S54S-LS; No Copyright; Avail.: CASI: A04, Hardcopy

The Professional, Scientific, and Technical Services sector (sector 54) of the 1997 Economic Census covers establishments with payroll that specialize in performing professional, scientific, and technical activities for others. These activities require a high degree of expertise and training. The establishments in this sector specialize according to expertise and provide services to clients in a variety of industries and, in some cases, to households. Activities performed include: legal advice and representation; accounting, bookkeeping, and payroll services; architectural, engineering, and specialized design services; computer services; consulting services; research services; advertising services; photographic services; translation and interpretation services; veterinary services; and other professional, scientific, and technical services. This sector excludes establishments primarily engaged in providing a range of day-to-day office administrative services, such as financial planning, billing and recordkeeping, personnel, and physical distribution and logistics. These establishments are classified in Sector 56, Administrative and Support and Waste Management and Remediation Services. Data for this sector are shown for establishments of firms subject to Federal income tax and separately of firms which are exempt from Federal income tax under provisions of the Internal Revenue Code. Many of the kinds of business or operation included in this sector are not thought of as commercial businesses and the terms (such as business, establishment, and firm) used to describe them may not be descriptive of such services. However, these terms are applied to all kinds of business or operation in order to maintain conformity in the measures of the production and delivery of goods and services and in the presentation of data. The basic tabulations for this sector do not include data for establishments which are auxiliary (primary function is providing a service, such as warehousing or bookkeeping) to service establishments within the same organization. Data for auxiliaries are presented separately.
NTIS
Census; Economic Analysis; Economics; Revenue

20080040903 Daniel L. Dawes and Myers, Dawes, Andras and Sherman, LLP, Irvine, CA, USA
Phantom Serializing Compiler and Method of Operation of Same
Nacul, A., Inventor; Glvargis, T., Inventor; 14 Sep 05; 33 pp.; In English
Contract(s)/Grant(s): 0205712
Patent Info.: Filed Filed 14 Sep 05; US-Patent-Appl-SN-11-227 781
Report No.(s): PB2008-104350; No Copyright; Avail.: CASI: A03, Hardcopy

The invention includes a computer and a method of operating a computer to generate a program for an embedded processor comprising the steps of compiling a multitask application with a generic front-end compiler to generate a basic block (BB) control flow graph (CFG) of the multitask application; generating non-preemptive blocks of code from the control flow graph (CFG) with a partitioning module, which blocks of code are defined as AEBs (atomic execution blocks); performing a live variable analysis on the AEB graphs to generate a live variable result; feeding back to the live variable result to the partitioning module to refine the partitions until acceptable preemption, timing, and latency are achieved, the AEB graphs having determined AEB nodes; and generating a corresponding executable code for each AEB node in a code generator.
NTIS
Compilers; Embedding; Patent Applications

20080040904 Ference and Associates, Pittsburgh, PA, USA

Enabling and Disabling Cache Bypass using Predicted Cache Line Usage

Hu, Z., Inventor; Robinson, J. T., Inventor; Shen, X., Inventor; Sinharoy, B., Inventor; 19 Nov 04; 11 pp.; In English

Contract(s)/Grant(s): NBCH30390004

Patent Info.: Filed Filed 19 Nov 04; US-Patent-Appl-SN-10-993 531

Report No.(s): PB2008-104349; No Copyright; Avail.: CASI: A03, Hardcopy

Arrangements and method for enabling and disabling cache bypass in a computer system with a cache hierarchy. Cache bypass status is identified with respect to at least one cache line. A cache line identified as cache bypass enabled is transferred to one or more higher level caches of the cache hierarchy, whereby a next higher level cache in the cache hierarchy is bypassed, while a cache line identified as cache bypass disabled is transferred to one or more higher level caches of the cache hierarchy, whereby a next higher level cache in the cache hierarchy is not bypassed. Included is an arrangement for selectively enabling or disabling cache bypass with respect to at least one cache line based on historical cache access information.

NTIS

Bypasses; Computers; Patent Applications

20080040905 UT-Battelle, LLC, Oak Ridge, TN, USA

System and Method for Identifying, Validating, Weighing and Characterizing Moving or Stationary Vehicles and Cargo

Beshears, D. L., Inventor; Batsell, S. G., Inventor; Abercrombie, R. K., Inventor; Scudiere, M. B., Inventor; White, C. P., Inventor; 24 Nov 04; 18 pp.; In English

Contract(s)/Grant(s): DE-AC05-00OR22725

Patent Info.: Filed Filed 24 Nov 04; US-Patent-Appl-SN-10-998 305

Report No.(s): PB2008-104344; No Copyright; Avail.: CASI: A03, Hardcopy

An asset identification and information infrastructure management (AI3M) device having an automated identification technology system (AIT), a Transportation Coordinators' Automated Information for Movements System II (TC-AIMS II), a weigh-in-motion system (WIM-II), and an Automated Air Load Planning system (AALPS) all in electronic communication for measuring and calculating actual asset characteristics, either statically or in-motion, and further calculating an actual load plan.

NTIS

Cargo; Identifying; Information Management; Information Systems; Patent Applications; Transportation

20080040929 Patent and Trademark Office, Washington, DC USA

Information Security in Contracts Needs Better Enforcement and Oversight. Public Release

Sep. 2005; 23 pp.; In English

Report No.(s): PB2008-103628; No Copyright; Avail.: CASI: A03, Hardcopy

The Federal Information Security Management Act (FISMA) requires agencies to develop and implement programs to protect information and information technology (IT) systems. FISMA requirements apply to all federal contractors who use federal information, or operate or have access to federal information systems on behalf of an agency. The Office of Management and Budget (OMB) has cited contractor security as a government-wide challenge since 2001and has directed agencies and the OIG to report on agency oversight of contractor IT security. In response to findings and recommendations made by OIG in May 2002, the Department issued two contract clauses containing IT security requirements. USPTO, as part of its information security program, adopted these clauses to protect information and IT systems from risks posed by contractors who connect to its network or process or store sensitive agency information. The clauses require contractors to comply with USPTOs IT security handbook, have their IT systems certified and accredited, and have their employees undergo appropriate background screening. We conducted our evaluation to determine whether USPTO had incorporated the two security clauses into IT service contracts and to evaluate the implementation of the clause requirements. We found that most contracts in our sample contained the clauses and that contractor employees receive IT security awareness training. However, USPTO is not properly implementing key requirements in the clauses and in some cases is not enforcing them. Specifically, USPTO designated all contracts in our sample as low risk, even though the relevant criteria suggest that some contracts should have high or moderate risk designations. In these cases, contractors did not receive the appropriate background screening. In addition, contractors have not submitted certification and accreditation packages, and therefore no contractor IT system has been certified or accredited. We recommend that the Under Secretary of Commerce for Intellectual Property and Director of the U.S. Patent and Trademark Office direct appropriate management officials to ensure that contractor IT security is improved

by, among other things, developing plans for establishing appropriate risk designations for contracts and certifying and accrediting contractor systems.
NTIS
Contractors; Information Management; Information Systems; Security

20080040943 Orrick, Herrington and Sutcliffe, LLP, Irvine, CA, USA; California Univ., Berkeley, CA, USA
Functional Coverage Driven Test Generation for Validation of Pipelined Processors
Mishra, P., Inventor; Dutt, N., Inventor; 9 Sep 05; 18 pp.; In English
Contract(s)/Grant(s): 0203813; 0205712
Patent Info.: Filed Filed 9 Sep 05; US-Patent-Appl-SN-11-223 784
Report No.(s): PB2008-103807; No Copyright; Avail.: CASI: A03, Hardcopy

A functional coverage based test generation technique for pipelined architectures is presented. A general graph-theoretic model is developed that can capture the structure and behavior (instruction-set) of a wide variety of pipelined processors. A functional fault model is developed and used to define the functional coverage for pipelined architectures. Test generation procedures are developed that accept the graph model of the architecture as input and generate test programs to detect all the faults in the functional fault model. A graph model of the pipelined processor is automatically generated from the specification using functional abstraction. Functional test programs are generated based on the coverage of the pipeline behavior. Module level property checking is used to reduce test generation time.
NTIS
Parallel Processing (Computers); Patent Applications; Pipelines

20080040944 IPSI Belgrade, Belgrade, Serbia
International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro)
2005; In English; IPSI-2005 Montenegro, 24 Sep. - 1 Oct. 2005, Montenegro; See also 20080040945 - 20080040963; Original contains color illustrations; Copyright; Avail.: CASI: C01, CD-ROM

Topics discussed include: Environmental Theory of Mentality; Bitmap Indexing of XML Data; Performance Evaluation of Optimal Interconnection-based Routing Algorithms in Multi-operator Telecommunication Network; Knowledge vs. Intelligence; New Approach to Data Warehouse Development; Meaning of 'Individuals Diversity' for Information-System-Design-as-Organization-Design, and Significance of 'Web-based' as Design Solution; Reusable Agent-based Framework for Deployment in Multiagent Systems; A Study on the Multiple Packaging Techniques for Digital Rights; Prediction Diagnostic for Warning of Catastrophes; Strategic Configuration Management: A New Approach for Software Change management; Internet Based Telemedicine Services in Montenegro-Challenges and Experiences; Autonomic Information Networking: BRAIN; Engineering Vacuum using High Density Packets of Electrons for Space Flight Applications; Analysis of the Producer-Consumer Problem; Envelope Model: Data Access from Anywhere; Z-Axis Interconnection for Enhanced Wiring in Organic Laminate Electronic Packages; On the Functional Characterization of 'Intelligent' Materials; The Shortest Way in Space; and Multi-tasking in Laser Scanning Confocal Microscopy towards Cell Profiling.
Derived from text
Computer Programs; Document Markup Languages; Information Systems; Systems Engineering; Laser Applications; Internets; Telemedicine; Scanning

20080040945 Ministry of Health, Montenegro
Internet Based Telemedicine Services in Montenegro-Challenges and Experiences
Stojanovic, S.; Stojanovic, R.; Obradovic, I.; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 6 pp.; In English; See also 20080040944; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

'TeleCG'is the first system that uses Internet/Intranet technologies for exchanging patient information among health care providers in Montenegro. In order to make up one cost effective 'Virtual Clinic on the Internet', it employees the approachable software technologies such as .NET programming, PHP, mySQL, URL and Web Servers as well as intelligent hardware gateways for importing and transferring wide range of medical signals. The system enables effective access to the patient data by means of any device equipped with a Web browser, such as traditional Personal Computer, workstation, modern Personal Digital Assistance or mobile phone. In this paper we discuss the proposed architecture, challenges we faced and the means

by which we overcome these challenges. The effectiveness of the proposed solutions has been evaluated in cardiology through installed pilot system that interconnects three remote centers, Bar, Podgorica and Berane.
Author
Computer Networks; Internets; Software Engineering; Telemedicine; Medical Services

20080040946 France Telecom International, Lannion, France
Autonomic Information Networking: BRAIN
Salaun, Mikael; Beker, Sergio; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 6 pp.; In English; See also 20080040944; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The 'multi-disciplinary' research project called BRAIN (Basic Research in Autonomic Information Networking) aim to design new tools in order to reach the following set of functionalities; (1) Improving of the network and service management (2) Helping fault detection (3) Auto-repairing, auto-configuration and localisation of equipments All the concerned works and proposals should help France Telecom to build and to improve the autonomy of all its telecoms systems and networks. This project is also a research program that has the ambition for defining and developing a software environment to insure uniformity in the architecture.
Author
Telecommunication; Electronic Commerce; Internet Resources; Internets

20080040949 AMA International Univ., Bahrain
Strategic Configuration Management: A New Approach for Software Change management
Srinivas, Nowduri; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 7 pp.; In English; See also 20080040944; Original contains black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The strategic management techniques are becoming very important to handle the uncertainties arising from the dynamically changing markets. Thereby if the configuration management activities are coupled with the market change visions it automatically makes the organizations more point focused, more productive and quality oriented. In this paper a new pattern of configuration management, a coupling of strategic management oriented activities and configuration management activities is proposed which results in strategic change and version control. Closed Loop and Open Loop models are proposed. The improvements because of Strategic Configuration Management are discussed with emphasis on the development cycle minimization, process improvement and product quality.
Author
Configuration Management; Management Methods

20080040950 Czech Technical Univ., Prague, Czechoslovakia
Prediction Diagnostic for Warning of Catastrophes
Novak, Mirko; Votruba, Zdenek; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 10 pp.; In English; See also 20080040944; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Human society suffers from various accidents and catastrophes. The influence of such events was recognizable through all the human history, however their significance increases with the size of human population in general and with its density in particular parts of the world. Contemporary, such regional catastrophes, like the December 26, 2004 earthquake near Sumatra can cause the death of several hundreds thousand people and tremendous financial losses. Such accidental or catastrophic events appear usually unexpected and the people are not prepared to face them. This fact multiplies usually the losses. Though there is often very difficult to predict the advent of accidents and catastrophes, our present knowledge of system theory, system reliability, signal analysis together with modern computer, sensor and communication technology opens the possibility that at least something can be done. The analysis of accidental and catastrophic events tells that only very rarely they appear absolutely without any preceding signals. Such signals can be of course very weak and hardly recognizable, nevertheless, careful and systematic use of sophisticated analysis of data (mainly in the form of time-series) reached from various sensors gives the hope that the advent of particular nonstandard situation can be detected. The respective prediction diagnostic involves: a) analysis of the frequency of appearance of particular nonstandard situations, b) systematic recording

of all relevant data representing the system parameters, in which or among which the information of nonstandard situation advent can be hidden, c) investigation of indicators of possible nonstandard situations d) systematic data-mining of appearance of such indicators in respective data bases, e) analysis of the sensitivities of particular system properties and functions on system parameters and estimation, which of them are most significant, f) determination of limits of acceptable changes of the most sensitive system parameters, g) prediction of further development of most sensitive parameters and estimation of time, in which its vector approaches or breaks the boundaries of the respective region of acceptability, h) starting the activity of reliable and efficient warning system. The signals of warning system must be distributed in appropriate time and understandable form in the whole region of the expected nonstandard situation. All the individuals and organizations in such regions have also to be prepared and trained for appropriate reactions. In this contribution we discuss some aspects of system prediction diagnostic, which can in general improve the operation reliability and efficiency of warning systems.
Author
Accidents; Design Analysis; Disasters; Systems Analysis; Warning Systems; Hazards

20080040951 Creative C Corp., Park City, UT, USA
Knowledge vs. Intelligence
Halladay, Steven M.; Milligan, Charles A.; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 8 pp.; In English; See also 20080040944; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Current knowledge representations focus on building systems that are based on sets of rules and on ontology. The intent is to enable one to incorporate computational models that people can understand and engineer. However, ability to formulate a knowledge representation even when that representation is augmented with a rich set of both relationship type and quantity does not imply the ability to drive a decision process to conclusion. This paper introduces a new discipline entitled intelligence simulation. Simulated intelligence differs from knowledge representation in that simulated intelligence relaxes the requirements of human understanding while maintaining the capability for human interaction. The emphasis is on computational capability and localizing ontology via relationship maps. Thus, instead of an engineering functionality, intelligence simulation principles emphasize Network Science connectivity of basic information blocks for processing pathways through knowledge maps.
Author
Intelligence; Knowledge Representation; Simulation

20080040953 Southeast Univ., Nanjing, China
Analysis of the Producer-Consumer Problem
Ping, Sun Lun; Chen, Jianlong; Pan, Lo; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 4 pp.; In English; See also 20080040944; Copyright; Avail.: CASI: A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Many mathematicians would agree that, had it not been for the improvement of Markov models, the refinement of the Turing machine might never have occurred. In fact, few end-users would disagree with the evaluation of kernels, which embodies the extensive principles of electrical engineering. BAIL, our new algorithm for pervasive technology, facilitates the analysis of the producer-consumer problem in this context.
Author
Algorithms; Turing Machines; Artificial Intelligence

20080040955 Trizon Group, Montenegro
New Approach to Data Warehouse Development
Krulj, Darko; Cupic, Milutin; Martic, Milan; Suknovic, Milija; Delibasic, Boris; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 10 pp.; In English; See also 20080040944; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

In the last decade data warehouses (DW) have become the basis for business decision making support. This paper will present our framework for the development of data warehouse systems through developed applications: DW modeler and DW explorer. We present advantages and disadvantages of this approach in relation to the other frameworks for development of data warehouse systems. The basic characteristic of our approach is that it is based on XML meta data. We have also implemented significant changes in dimensional model based upon flexible dimensional hierarchies which enables us to use

special methods for creating aggregations and important advantages in data visualization. In our framework we use intelligent creation concept for aggregates based on observation of history of user queries.
Author
Data Systems; Data Storage; Document Storage; Metadata; Data Management; Information Retrieval; Information Systems

20080040960 Jai-Hind Coll., Mumbai, India
Envelope Model: Data Access from Anywhere
Kulkarni, Sushil; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 20 pp.; In English; See also 20080040944; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

In this paper, a definition of Mobile database and mobile transaction with illustrations from spatial and temporal databases are given. Corresponding to mobile transaction mobile query is defined. New Model called Envelope model is presented to execute a mobile query using various base stations of the closed spheres. A mobile query is defined as the union of jumping queries and contains only one unary or binary operator operating on the database. A mobile transaction is the union of jumping transactions where each jumping transaction is the unit of execution at the base station. The jumping condition is checked prior to the start of each jumping query at the base station. This model is implemented using developed environment called Data Invoking Capsule. It is located at e very base station and its main job is to transfer the message from one base station to another, executing jumping queries and storing envelopes. A mobile unit makes a request to execute mobile query to base station called initialize who creates a basket that store jumping query number and directed parse tree,. This basket is carried by the mobile unit till mobile unit is completely executed. Directed parse tree is created by an initialize using parse tree. It gives guidelines for execution of jumping query at the respective base stations. After the jumping query is executed an envelope is created, that store jumping query number and the result obtained by executing jumping query. Envelope flies from one base station to another as required by another base station for executing next jumping query under guidelines of directed parse tree. Every base station may not have the required database on which the jumping query is executed so the method is proposed to execute it. Algorithms for creating directed parse tree and an envelope model are provided. Parallel execution of jumping transaction at a base station is also discussed. Envelope model for mobile transaction is introduced.
Author
Algorithms; Data Bases; Query Languages; Wireless Communication; Distributed Processing; Computer Networks

20080041051 Bureau of the Census, Washington, DC, USA
Economic Census 1997: Information. Subject Series. Summary
Apr. 2001; 63 pp.; In English
Report No.(s): PB2008-104021; EC97S51S-SM; No Copyright; Avail.: CASI: A04, Hardcopy

The Information sector (sector 51) of the 1997 Economic Census comprisesestablishments engaged in the following processes: (a) producing and distributing information and cultural products,(b) providing the means to transmit or distribute these products as well as data or communications,and (c) processing data. The main components of this sector are the publishing industries,including software publishing,the motion picture and sound recording industries,the broadcasting and telecommunications industries,and the information services and data processing services industries. The expressions information age and global information economy are used with considerable frequency today. The general idea of an information economy includes both the notion of industries primarily producing, processing,and distributing information,as well as the idea that every industry is using available information and information technology to reorganize and make themselvesmore productive. For the purpose of developing NAICS,it is the transformation of information into a commodity that is produced and distributed by a number of growing industries that is at issue. The Information sector groups three types of establishments: (1) those engaged in producing and distributing information and cultural products;(2) those that provide the means to transmit or distribute these products as well as data or communications; and (3) those that process data. Cultural products are those that directly express attitudes,opinions, ideas,values,and artistic creativity; provide entertainment; or offer information and analysis concerning the past andpresent. Included in this definition are popular,mass-produced,products as well as cultural products that normally have a more limited audience,such as poetry books,literary magazines,or classical records.
NTIS
Census; Economic Analysis; Economics; Industries

20080041052 Bureau of the Census, Washington, DC, USA
Economic Census 1997: Information. Subject Series. Miscellaneous Subjects
Feb. 2001; 111 pp.; In English
Report No.(s): PB2008-103980; EC97S51S-SB; No Copyright; Avail.: CASI: A06, Hardcopy

The Information sector (sector 51) of the 1997 Economic Census comprises establishments engaged in the following processes: (a) producing and distributing information and cultural products,(b) providing the means to transmit or distribute these products as well as data or communications,and (c) processing data. The main components of this sector are the publishing industries,including software publishing,the motion picture and sound recording industries,the broadcasting and telecommunications industries,and the information services and data processing services industries. The expressions information age and global information economy are used with considerable frequency today. The general idea of an information economy includes both the notion of industries primarily producing, processing,and distributing information,as well as the idea that every industry is using available information and information technology to reorganize and make themselves more productive. For the purpose of developing NAICS,it is the transformation of information into a commodity that is produced and distributed by a number of growing industries that is at issue. The Information sector groups three types of establishments: (1) those engaged in producing and distributing information and cultural products;(2) those that provide the means to transmit or distribute these products as well as data or communications; and (3) those that process data. Cultural products are those that directly express attitudes,opinions, ideas,values,and artistic creativity; provide entertainment; or offer information and analysis concerning the past and present. Included in this definition are popular,mass-produced, products as well as cultural products that normally have a more limited audience, such as poetry books,literary magazines,or classical records.

NTIS
Census; Economic Analysis; Economics; Industries

20080041053 Bureau of the Census, Washington, DC, USA
Economic Census 1997: Information. Subject Series. Sources of Receipts
Aug. 2000; 53 pp.; In English
Report No.(s): PB2008-103979; EC97S51S-LS; No Copyright; Avail.: CASI: A04, Hardcopy

The Information sector (sector 51) of the 1997 Economic Census comprises establishments engaged in the following processes: (a) producing and distributing information and cultural products,(b) providing the means to transmit or distribute these products as well as data or communications,and (c) processing data. The main components of this sector are the publishing industries,including software publishing,the motion picture and sound recording industries,the broadcasting and telecommunications industries,and the information services and data processing services industries. The expressions information age and global information economy are used with considerable frequency today. The general idea of an information economy includes both the notion of industries primarily producing, processing,and distributing information,as well as the idea that every industry is using available information and information technology to reorganize and make themselves more productive. For the purpose of developing NAICS,it is the transformation of information into a commodity that is produced and distributed by a number of growing industries that is at issue. The Information sector groups three types of establishments: (1) those engaged in producing and distributing information and cultural products;(2) those that provide the means to transmit or distribute these products as well as data or communications; and (3) those that process data. Cultural products are those that directly express attitudes,opinions, ideas,values,and artistic creativity; provide entertainment; or offer information and analysis concerning the past and present. Included in this definition are popular,mass-produced,products as well as cultural products that normally have a more limited audience,such as poetry books,literary magazines,or classical records.

NTIS
Census; Economic Analysis; Economics; Industries

20080041453 Wilson (Jenkins) and Taylor, PA, Durham, NC, USA; Duke Univ., Durham, NC, USA
Systems, Methods, and Computer Program Products for Transmitting Neural Signal Information
Wolf, P. D., Inventor; Obeid, I., Inventor; 29 Nov 04; 13 pp.; In English
Contract(s)/Grant(s): DARPA-N66001-02-C-8022
Patent Info.: Filed Filed 29 Nov 04; US-Patent-Appl-SN-10-998 385
Report No.(s): PB2008-103575; No Copyright; Avail.: CASI: A03, Hardcopy

Systems, Methods, and Computer Program Products for Transmitting Neural Signal Information. Systems, method, and computer program products are provided for neural signal transmission. A system according to one embodiment can include

a signal receiver operable to receive a neural signal comprising an action potential. The system can also include an action potential detector operable to communicate with the signal receiver and detect when the action potential occurs. In addition, the system can include a transmitter in communication with the action potential detector and operable to transmit an information signal indicating the time when the action potential occurs and, in addition, can transmit samples associated with a detected action potential.
NTIS
Computer Programs; Data Transmission; Neural Nets; Patent Applications; Transmission

20080041464 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Mono for Cross-Platform Control System Environment
Nishimura, H.; Timossi, C.; January 2007; 2 pp.; In English
Contract(s)/Grant(s): DE-AC03-76SF00098
Report No.(s): DE2007-918490; No Copyright; Avail.: Department of Energy Information Bridge

Mono is an independent implementation of the .NET Framework by Novell that runs on multiple operating systems (including Windows, Linux and Macintosh) and allows any .NET compatible application to run unmodified. We present the results of tests we performed to evaluate the portability of our controls system .NET applications from MS Windows to Linux.
NTIS
Graphical User Interface; Operating Systems (Computers); Control Systems Design

20080042160 Fermi National Accelerator Lab., Batavia, IL, USA
End-to-End Network/Application Performance Troubleshooting Methodology
Wu, W.; Bobyshev, A.; Bowden, M.; Crawford, M.; Demar, P.; January 2007; 9 pp.; In English
Report No.(s): DE2007-917085; FERMILAB-CONF-07-470-CD; No Copyright; Avail.: Department of Energy Information Bridge

The computing models for HEP experiments are globally distributed and grid-based. Obstacles to good network performance arise from many causes and can be a major impediment to the success of the computing models for HEP experiments. Factors that affect overall network/application performance exist on the hosts themselves (application software, operating system, hardware), in the local area networks that support the end systems, and within the wide area networks. Since the computer and network systems are globally distributed, it can be very difficult to locate and identify the factors that are hurting application performance. In this paper, we present an end-to-end network/application performance troubleshooting methodology developed and in use at Fermilab. The core of our approach is to narrow down the problem scope with a divide and conquer strategy. The overall complex problem is split into two distinct sub-problems: host diagnosis and tuning, and network path analysis. After satisfactorily evaluating, and if necessary resolving, each sub-problem, we conduct end-to-end performance analysis and diagnosis. The paper will discuss tools we use as part of the methodology. The long term objective of the effort is to enable site administrators and end users to conduct much of the troubleshooting themselves, before (or instead of) calling upon network and operating system wizards, who are always in short supply.
NTIS
Computer Networks; Maintenance; Applications Programs (Computers); Network Analysis; Diagnosis; Reliability Analysis

20080042246 Fermi National Accelerator Lab., Batavia, IL, USA
Metropolitan Area Network Support at Fermilab
DeMar, P.; Andrews, C.; Bobyshev, A.; Crawford, M.; Colon, O.; January 2007; 6 pp.; In English
Report No.(s): DE2007-917084; FERMILAB-CONF-07-484-CD; No Copyright; Avail.: National Technical Information Service (NTIS)

Advances in wide area network service offerings, coupled with comparable developments in local area network technology have enabled many research sites to keep their off-site network bandwidth ahead of demand. For most sites, the more difficult and costly aspect of increasing wide area network capacity is the local loop, which connects the facility LAN to the wide area service provider(s). Fermilab, in coordination with neighboring Argonne National Laboratory, has chosen to provide its own local loop access through leasing of dark fiber to nearby network exchange points, and procuring dense wave division multiplexing (DWDM) equipment to provide data channels across those fibers. Installing and managing such optical

network infrastructure has broadened the Laboratorys network support responsibilities to include operating network equipment that is located off-site, and is technically much different than classic LAN network equipment. Effectively, the Laboratory has assumed the role of a local service provider. This paper will cover Fermilabs experiences with deploying and supporting a Metropolitan Area Network (MAN) infrastructure to satisfy its offsite networking needs. The benefits and drawbacks of providing and supporting such a service will be discussed.
NTIS
Cities; Computer Networks; Local Area Networks

20080042278 Baker and Botts, New York, NY, USA
Systems and Methods for De-Blurring Motion Blurred Images
Ben-Ezra, M., Inventor; Nayar, S. K., Inventor; 3 Nov 04; 21 pp.; In English
Contract(s)/Grant(s): NSF-IIS-00-85864
Patent Info.: Filed Filed 3 Nov 04; US-Patent-Appl-SN-10-980 559
Report No.(s): PB2008-104007; No Copyright; Avail.: CASI: A03, Hardcopy

Systems and methods for providing a substantially de-blurred image of a scene from a motion blurred image of the scene are disclosed. An exemplary system includes a primary detector for sensing the motion blurred image and generating primary image information representing the blurred image, a secondary detector for sensing two or more secondary images of the scene and for generating secondary image information representing the two or more secondary images, and a processor for determining motion information from the secondary image information, estimating a point spread function for the motion blurred image from the motion information, and applying the estimated point spread function to the primary image information to generate information representing the substantially de-blurred image.
NTIS
Blurring; Patent Applications; Image Motion Compensation; Detection

20080042317 Federal Highway Administration, Washington, DC, USA
Effective Use of Weigh-In-Motion Data: The Netherlands Case Study
Oct. 2007; 6 pp.; In English
Report No.(s): PB2008-104428; FHWA-PL-07-028; No Copyright; Avail.: National Technical Information Service (NTIS)

Transportation and law enforcement agencies in the Netherlands have developed a robust weigh-in-motion (WIM) data management system that supports a broad array of vehicle weight regulation and enforcement activities, as well as long-term planning and decisionmaking. The system, which Dutch officials describe as a better way of doing business, has potential for application in U.S. states that want to expand their use of WIM data.
NTIS
Data Management; Management Systems; Netherlands

20080042341 Michigan State Univ., East Lansing, MI, USA
Preparation Gap: Teacher Education for Middle School Mathematics in Six Countries. Mathematics Teaching in the 21st Century (MT21)
Schmidt, W. H.; Tatto, M. T.; Bankov, K.; Blomeke, S.; Cedillo, T.; January 2007; 28 pp.; In English
Report No.(s): PB2008-104265; Copyright; Avail.: National Technical Information Service (NTIS)

A new study funded by the National Science Foundation (NSF) found that middle school mathematics teachers in the USA are not as well prepared to teach this challenging subject as are many of their counterparts in five other countries. 'Our future teachers are getting weak training mathematically and are just not prepared to teach the demanding mathematics curriculum we need for middle schools if we hope to compete internationally in the future,' said William Schmidt, MSU distinguished professor, who directed the study. This inadequate teacher preparation joins deficiencies in mathematics curriculum as reasons contributing to lower scores for American middle-schoolers. MT21 studied how well a sample of universities and teacher-training institutions prepare middle school mathematics teachers in the USA, South Korea, Taiwan, Germany, Bulgaria and Mexico.
NTIS
Education; Instructors; Schools; Mathematics

20080042351 Moser, Patterson, Sheridan, LLP, Shrwesbury, NJ, USA; SRI International Corp., Arlington, VA, USA
Method and Apparatus for Recognizing Text in an Image Sequence of Scene Imagery
Myers, G. K., Inventor; Bolles, R. C., Inventor; Luong, Q. T., Inventor; Herson, J. A., Inventor; 11 Jan 06; 18 pp.; In English
Patent Info.: Filed Filed 11 Jan 06; US-Patent-Appl-SN-11-330 494
Report No.(s): PB2008-104011; No Copyright; Avail.: CASI: A03, Hardcopy

An apparatus and a concomitant method for detecting and recognizing text information in a captured imagery. The present method transforms the image of the text to a normalized coordinate system before performing OCR, thereby yielding more robust recognition performance. The present invention also combines OCR results from multiple frames, in a manner that takes the best recognition results from each frame and forms a single result that can be more accurate than the results from any of the individual frames.

NTIS
Character Recognition; Image Processing; Imagery; Patent Applications; Texts

20080042352 Myers (Peacock), PC, Albuquerque, NM, USA; Lockheed Martin Corp., Bethesda, MD, USA
Automatic Scene Correlation and Identification
Han, R. Y., Inventor; Piper, T. J., Inventor; Castagno, R. P., Inventor; Martin, J. M., Inventor; 7 Dec 04; 27 pp.; In English
Contract(s)/Grant(s): AF-F08626-96-C-0002
Patent Info.: Filed Filed 7 Dec 04; US-Patent-Appl-SN-11-007 529
Report No.(s): PB2008-104010; No Copyright; Avail.: CASI: A03, Hardcopy

Computer software for and a method of determining location of a target image within a two-dimensional input image by employing a three-dimensional reference image comprising determining object edge points in the input image; given estimated seeker line-of-sight orientation and range data, computing a two-dimensional reference image from the three-dimensional reference image; applying a weighted-direction-cross-product Hough Transform to the object edge points and points of the two-dimensional reference image; classifying the input image as containing a target image or not; if the image contains a target image, identifying a location of the target image within the two-dimensional input image; computing confidence measure as to the selected location of the target image; and in the case of sequential decision, also performing confidence accumulation through multi-frames or multi-looks.

NTIS
Autocorrelation; Image Processing; Algorithms; Image Classification; Image Analysis

20080042360 International Trade Administration, Washington, DC, USA
FY 2007 FISMA Assessment of Core Network General Support System (ITA-012). Public Release
Sep. 2007; 8 pp.; In English
Report No.(s): PB2008-103622; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Information Management; Management Planning; Security; Support Systems

20080042369 International Business Machines Corp., Dallas, TX, USA
Apparatus and Method for Providing Remote Access Redirect Capability in a Channel Adapter of a System Area Network
Elnozahy, E. N., Inventor; Walker, P. A., Inventor; 13 Jan 05; 34 pp.; In English
Contract(s)/Grant(s): PERCS-NBCH303-90004
Patent Info.: Filed Filed 13 Jan 05; US-Patent-Appl-SN-11-034 557
Report No.(s): PB2008-104713; No Copyright; Avail.: CASI: A03, Hardcopy

A method and apparatus for providing remote access redirect in a host channel adapter of a system area network are provided. The apparatus and method provide a mechanism by which a host channel adapter, in response to receiving a marker message, places selected channel(s) of the host channel adapter in a remote access redirect (RAR) mode of operation. During the RAR mode of operation, memory access messages received by the host channel adapter that are destined for portions of an application memory space marked as being protected are converted to RAR receive messages and redirected to a queue pair associated with an operating system rather than the queue pair for the application. The operating system is responsible for serializing access to application memory pages outside of the host channel adapter. The mechanisms of the present invention may be used to perform a checkpoint data integrity operation.

NTIS
Adapters; Patent Applications; Computer Networks; Channels (Data Transmission)

60
COMPUTER OPERATIONS AND HARDWARE

Includes hardware for computer graphics, firmware and data processing. For components see *33 Electronics and Electrical Engineering*. For computer vision see *63 Cybernetics, Artificial Intelligence and Robotics*.

20080040961 Endicott Interconnect Technologies, Inc., Endicott, NY, USA
Z-Axis Interconnection for Enhanced Wiring in Organic Laminate Electronic Packages
Markovich, Voya R.; Egitto, F. D.; Krasniak, S. R.; Chan, B.; Blackwell, K. J.; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 9 pp.; In English; See also 20080040944; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Greater I/O density at the die level, coupled with more demanding performance requirements, is driving the need for improved wiring density and a concomitant reduction in feature sizes for electronic packages. Traditionally, greater wiring densities are achieved by reducing the dimensions of vias, lines, and spaces, increasing the number of wiring layers, and utilizing blind and buried vias. However, each of these approaches possess inherent limitations, for example those related to drilling and plating of high aspect ratio vias, reduced conductance of narrow circuit lines, and increased cost of fabrication related to additional wiring layers. One method of extending wirability beyond the limits imposed by these approaches is a strategy that allows for metal-to-metal z-axis interconnection of subcomposites during lamination to form a composite structure. Conductive joints can be formed during lamination using an electrically conductive paste. As a result, one is able to fabricate structures with vertically-terminated vias of arbitrary depth. Replacement of conventional plated through holes with vertically-terminated vias opens up additional wiring channels on layers above and below the terminated vias, enables die shrink, and eliminates via stubs which cause reflective signal loss. In addition, parallel lamination of testable subcomposites offers yield improvement, shorter cycle times, and ease of incorporating features conducive to high speed data rates, such as differential pair wiring and thicker laminates. As a case study, an example of a z-axis interconnect construction for a flip-chip plastic ball grid array package with a 150 3m die pad pitch is given. The processes and materials used to achieve smaller feature dimensions, satisfy stringent registration requirements, and achieve robust electrical interconnections are discussed.
Author
Circuits; Wiring; Chips (Electronics); Microelectronics; Density (Number/Volume); Integrated Circuits; Electronic Packaging

20080041705 Air Force Research Lab., Wright-Patterson AFB, OH USA
Frequency Calibration of A/D Converter in Software GPS Receivers
Liou, L L; Lin, D M; Tsui, J B; Schamus, J; Morton, J T; Jan 2005; 9 pp.; In English; Original contains color illustrations Report No.(s): AD-A484006; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484006

This paper presents a software-based method to calibrate Analog-to-digital converter (ADC) sampling frequency in a software GPS receiver. Two front-end systems of a GPS software receiver were used in this study. The sampling frequencies of the ADC were found deviated from the nominal values provided by the manufacturers. Software algorithm was developed to calibrate the sampling frequencies. The algorithm is based on the initial-code-phase velocity and the carrier-phase velocity of the GPS signals at L1 frequency obtained by software receiver measurements. Allan variance analysis of this frequency characterization method is also included in this study.
DTIC
Analog to Digital Converters; Calibrating; Frequency Converters; Global Positioning System; Receivers

20080041707 Army Tank-Automotive Research and Development Command, Warren, MI USA
What's New with Intel? A Look at Their Pentium III and IA-64 (Merced) Chips
Del Rose, Michael; Nov 14, 1999; 12 pp.; In English
Report No.(s): AD-A484009; TARDEC-14205; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484009

The Pentium III processor is the newest, and probably the last processor in the IA-32 architecture design by Intel. On its debut in late February 1999, it was under controversy. Not for it's enhancements over its predecessor, The Pentium II processor, but for its decision to insert the ID number into the chip. This is supposed to help the security of e-commerce, but it can be used to track people on the internet for marketing or other, malicious intentions. Never the less, there are quite a few important changes in the new design. The goals that Intel had put forth in designing the IA-64 (Merced) processor was to

design an architecture that could lead the industry in performance, be able to expand the chip over the next few decades, and maintain lull hardware compatibility with the IA-32. They decided to abandon their old architecture for their high-end processors. The new processor takes a few pages from CISC, RISC, and VLIW. The first processor from the IA-64 (Merced) family is code-named Itanium and is due to be released in the second or third quarter of 2000.
DTIC
Central Processing Units; Chips; Microprocessors

20080041922 Naval Postgraduate School, Monterey, CA USA
Security: Where Testing Fails
Irvine, Cynthia E; Jul 2000; 10 pp.; In English
Report No.(s): AD-A484474; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Computer security addresses the problem of enforcement of security policies in the presence of malicious users and software. Systems enforcing mandatory policies can create confinement domains that limit the damage incurred by malicious software executing in applications. To achieve assurance that the confinement domains cannot be breached, the underlying enforcement mechanism must be constructed to ensure that it is resistant to penetration by malicious software and is free of malicious artifacts. The limitations and contributions of testing in achieving these goals are discussed. Why would a national software testing laboratory advertise on its web page that it provides testing for functionality, compatibility, performance, scalability, and fault tolerance, but not security? The answer may lie in the fact that certain aspects of security policy can be described in completely non-subjective terms. For example, the policy may state that unauthorized individuals are not permitted to read classified material. Can testing ensure that policy will not be violated? This paper provides an overview of challenges that security poses to testing and describes the role of testing in the engineering of trustworthy systems.
DTIC
Computer Information Security; Computer Programs; Evaluation; System Effectiveness

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COMPUTER PROGRAMMING AND SOFTWARE

Includes software engineering, computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM. For computer software applied to specific applications, see also the associated category.

20080040870 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Operating System Abstraction Layer (OSAL)
Yanchik, Nicholas J.; November 05, 2007; 12 pp.; In English; Flight Software Workshop, 5-6 Nov. 2007, Laurel, MD, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080040870

This viewgraph presentation reviews the concept of the Operating System Abstraction Layer (OSAL) and its benefits. The OSAL is A small layer of software that allows programs to run on many different operating systems and hardware platforms It runs independent of the underlying OS & hardware and it is self-contained. The benefits of OSAL are that it removes dependencies from any one operating system, promotes portable, reusable flight software. It allows for Core Flight software (FSW) to be built for multiple processors and operating systems. The presentation discusses the functionality, the various OSAL releases, and describes the specifications.
CASI
Applications Programs (Computers); Software Engineering; Programming Environments; Software Development Tools; Computer Systems Design; Operating Systems (Computers)

20080040871 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Flight Software Design and On-orbit Maintenance
Calder, Alexander C.; November 05, 2007; 28 pp.; In English; Flight Software Workshop, 5-6 Nov. 2007, Laurel, MD, USA; Original contains black and white illustrations
Contract(s)/Grant(s): NNG04CA30D; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080040871

This viewgraph presentation discusses the maintenance of flight software (FSW) on-orbit and the design of that software to allow maintenance of programs while they are on orbit.
CASI
Applications Programs (Computers); Flight Control; Maintenance; Software Engineering; Maintainability; Computer Systems Design; Computer Systems Performance; Airborne/Spaceborne Computers

20080040872 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Current and Future Flight Operating Systems
Cudmore, Alan; November 05, 2007; 21 pp.; In English; Flight Software Workshop, 5 - 7 Nov. 2007, Laurel, Maryland, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080040872

This viewgraph presentation reviews the current real time operating system (RTOS) type in use with current flight systems. A new RTOS model is described, i.e. the process model. Included is a review of the challenges of migrating from the classic RTOS to the Process Model type.
Author
Real Time Operation; Software Engineering; Flight Control; Spacecraft Control

20080040957 Fachhochschule Merseburg Univ. of Applied Sciences, Merseburg, Germany
Reusable Agent-based Framework for Deployment in Multiagent Systems
Seder, Ivan; Weinkauf, Ronny; Neumann, Tobias; Neumann, Gabriel; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 7 pp.; In English; See also 20080040944; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

In past years the research community has created a number of different methodologies for construction of agent-based systems. Our approach combines the component-based software engineering (CSBE) with agent-oriented software engineering (AOSE) in order to close the gap between the design and implementation phase and to be applied for development of multiagent systems for planning tasks in urban systems. Our component model is framework based and specialized as reusable agent framework which can be deployed in a particular application domain of multiagent system (MAS). Our view of agent is pragmatic one and oriented to simplicity of architecture and and high level of reusability. The main requirements for framework construction are the capability of agent to communicate with agents of MAS, to gather knowledge about other agents of working environment and to store it in own knowledge base. Different roles of agents in MAS are built reusing the agent based framework as working instances according to the design structure of it. The differences between so generated different agent instances are their capabilities. The capabilities are stored as metadata in the knowledge base as description of their location and functionality. To use different capabilities, a mechanism to include web services is implemented in agent framework. We developed successfully a prototype of planning system for an urban area as experimental field for construction of MAS using agent-based framework.
Author
Software Engineering; Systems Engineering; Software Reuse; Software Development Tools; Computer Programming

20080041066 DePauw Univ., Greencastle, IN USA
The Effects of Seductive Details on Recognition Tests and Transfer Tasks
Towler, Annette; Kraiger, Kurt; Jun 2008; 34 pp.; In English
Contract(s)/Grant(s): DASW0-04-K-0002
Report No.(s): AD-A483155; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483155

This research focuses on the investigation of pre-training and in-training events that facilitate effective learning and the transfer of knowledge and skills acquired through distributed learning. We tested training effectiveness principles in the context of suboptimal learning. Specifically, we investigated the seductive details phenomenon, a condition in which the inclusion of interesting information irrelevant to the training objectives reduces trainee learning. In terms of our findings, we found no effect of seductive details on recall tests in the experiments. This finding is contrary to much of the previous research that has found that providing seductive details distracts trainees from learning and results in lower scores on recall tests than those who are not exposed to seductive details. However, we did find support for our proposition that inclusion of seductive details benefits transfer performance. These findings suggest that to enhance transfer, distributed learning designers should incorporate interesting yet tangential features into the technology.
DTIC
Computer Assisted Instruction; Education; Learning

20080041168 Army Engineer Research and Development Center, Vicksburg, MS USA
Application of a Regional Sediment Budget Analysis System for Florida's East Coast
Rosati, Julie D; Feb 2000; 18 pp.; In English
Report No.(s): AD-A483420; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483420

This paper develops preliminary regional sediment budgets for the Northeast and Central regions of the East Coast of Florida as part of 'proof-in-concept' testing of Version 2 of the Sediment Budget Analysis System (SBAS2000). Features of SBAS2000, a PC-based method for calculating sediment budgets for local and regional extents that may encompass multiple inlets and beaches, are illustrated through the application. The paper concludes with recommendations for improving regional sediment budget analyses.
DTIC
Coasts; Florida; Sediments

20080041237 Carnegie-Mellon Univ., Pittsburgh, PA USA
An Expressive Verification Framework for State/Event Systems
Chaki, Sagar; Clarke, Edmund; Grumberg, Orna; Ouaknine, Joel; Sharygina, Natasha; Touili, Tayssir; Veith, Helmut; Jun 2004; 18 pp.; In English
Contract(s)/Grant(s): N00014-01-1-0796
Report No.(s): AD-A483430; CMU-CS-04-145; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Specification languages for concurrent software systems need to combine practical algorithmic efficiency with high expressive power and the ability to reason about both states and events. We address this question by defining a new branching-time temporal logic SE-A(OMEGA) which integrates both state-based and action-based properties. SE-A(OMEGA) is universal, i.e., preserved by the simulation relation, and thus amenable to counterexample-guided abstraction refinement. We provide a model-checking algorithm for this logic, and describe a compositional abstraction-refinement loop which exploits the natural decomposition of the concurrent system; the abstraction and refinement steps were performed over each component separately, and only the model checking step requires an explicit composition of the abstracted components. For experimental evaluation, we have integrated the presented algorithms in the software verification tool MAGIC, and determined a previously unknown race condition error in a piece of an industrial robot control software.
DTIC
Error Detection Codes; Program Verification (Computers)

20080041240 Michigan Univ., Ann Arbor, MI USA
Electromagnetic Wave Propagation in Optical Guiding Structures: Numerical Modeling
Litchinitser, Natalia M; Sep 11, 2007; 9 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-06-1-0503
Report No.(s): AD-A483439; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We have developed a website on Numerical Modeling of Optical Waveguides (http://optical-waveguides-modeling.net) that contains a Waveguide Tutorial, which summarizes basic concepts of light propagation in optical waveguides, dispersive, and nonlinear properties, and a broad collection of free and commercial software available for numerical simulations of waveguiding structures, supplied with a short summary of its capabilities and potential applications, a list of references to research papers that utilize a particular software package, and a link to the software provider's page. We provide the visitors of our website with an online file-sharing facility to be used to exchange simulation codes, documentation, and other relevant
DTIC
Electromagnetic Wave Transmission; Mathematical Models; Optical Waveguides

20080041247 Naval Postgraduate School, Monterey, CA USA
Data Strategies to Support Automated Multi-Sensor Data Fusion in a Service Oriented Architecture
Rothenhaus, Kurt J; Jun 2008; 240 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483454; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The quantity of data available to decision makers of various types is rapidly expanding beyond the pace of manual interpretation techniques (Hobbins, 1). Introducing a Service Oriented Architectures (SOA) based web service framework that exposes even more data without sufficient guidance will exacerbate the situation. Ontology's, data descriptions and discovery methods alone are not enough to create the end-to-end solutions promised by SOA technologies. Software architectural

patterns in conjunction with broad data strategies are required to harness and employ vast quantities of content. This dissertation provides two software architectural patterns and an auto-fusion process that guide the development of a distributed, accountable and scalable SOA framework to support improved control and monitoring software. Although applicable to a wide range of software control system challenges, the dissertation will focus on a Maritime Domain Awareness (MDA) interoperability challenges. Using the U.S. Navy's MDA project as a case study, this dissertation will design, build and test a prototype automated data fusion framework employing the trickle-up and Command and Control Zone pattern that automates the discovery, pedigree assessment and ultimate fusion of dissimilar data types in a SOA web-service supported framework.
DTIC
Architecture (Computers); Multisensor Fusion; Service Oriented Architecture

20080041248 Naval Postgraduate School, Monterey, CA USA
A Theory of Software Project Management and PROMOL: A Project Management Modeling Language
Demir, Kadir A; Osmundson, John S; Mar 1, 2008; 37 pp.; In English
Report No.(s): AD-A483462; NPS-IS-08-006; No Copyright; Avail.: Defense Technical Information Center (DTIC)
Effective software project management is the key to successful completion of IT software projects. A positive theory of software project management helps to illuminate the path to effective management. Here, we introduce a simple, yet powerful, software project management theory that helps us to understand the conditions and drivers that lead to functional and dysfunctional project behavior. We identify a set of criteria for assessing current and future modeling tools. Finally, we introduce a formal and visual modeling language for management of software projects.
DTIC
Computer Programming; Computer Programs; Project Management; Software Engineering

20080041250 Naval Postgraduate School, Monterey, CA USA
Automated Metadata Extraction
Migletz, James; Jun 2008; 83 pp.; In English
Report No.(s): AD-A483465; No Copyright; Avail.: Defense Technical Information Center (DTIC)
Metadata is data that describes data. There are many computer forensic uses of metadata and being able to extract metadata automatically provides positive forensic implications. This thesis presents a new technique for batch processing disk images and automatically extracting metadata from files and file contents. The technique is embodied in a program called fiwalk that has a plug-in architecture allowing new metadata extractors to be readily incorporated. Output from fiwalk can be provided in multiple formats such as ARFF and text. The plug-ins created for this thesis include one created by Simson Garfinkel for extracting metadata from .jpeg files, two for Microsoft Office documents (one for prior to Office 2007 release and one for Office 2007 release), and a default plug-in for extracting metadata from .gif, .pdf, and .mp3 files. To better understand the metadata available in common file formats such as .doc, .docx, .odt, .pdf, .mp3, .mp4, .jpeg, .tiff, and .gif, an examination of these formats is provided.
DTIC
Extraction; Metadata; Pattern Recognition

20080041251 Naval Postgraduate School, Monterey, CA USA
High Performance Parallel Java with JavaParty
Nassar, Samuel; Jun 2008; 79 pp.; In English
Report No.(s): AD-A483466; No Copyright; Avail.: Defense Technical Information Center (DTIC)
To achieve better performance with Java applications, computers can be interconnected with fast networks to form a cluster making available multiple Java Virtual Machines. Unfortunately, Java does not provide an elegant, easy to use mechanism for parallel programming on clusters. JavaParty transparently adds remote objects to Java while avoiding the disadvantages of programming with remote method invocation (RMI) and many disadvantages of the message-passing approach in general. This thesis presents a performance analysis of a cluster running a Java benchmark using JavaParty. It reveals quantitative performance measurements showing a decrease in application execution time by adding more machines. In addition, this thesis presents a method to increase the performance of the cluster network in the presence of network congestion using Quality of Service (QoS).
DTIC
Compilers; Computer Programming; Java (Programming Language); Object-Oriented Programming

20080041257 Naval Postgraduate School, Monterey, CA USA

Analysis, Design, and Implementation of a Logical Proof-of-Concept Prototype for Streamlining the Advertisement of Billets for the U.S. Marine Corps Reserve

Mohler, Jon D; Thorpe, John M; Jun 2008; 271 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483486; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The primary objective of this thesis is to provide the Marine Corps with a thorough bottom up System Analysis of the next generation billet advertisement system that will replace Reserve Duty Online (RDOL). The study includes a detailed systems analysis, a generic architecture, logical data models, process models and a system model which provides the Marine Corps with a blueprint of the requirements for the next system of record. The secondary objective of this thesis was to analyze current system architectures that advertise and fill job vacancies within the Department of Defense (DoD), as well as commercial-off-the-shelf (COTS) products in order to identify what architecture should be leveraged by the Marine Corps during its next build. In the midst of the long war, it is clearly evident that the reserve is an integral part of the Marine Corps total force. This integration hinges on the recognition that the ability for our reservists to be able to easily search and identify available opportunities is of the utmost importance. The proposed architecture and requirements analysis presented in this thesis will provide a solid foundation for the development of a next generation system.

DTIC

Billets; On-Line Systems; Prototypes; Proving; Reserves; Streamlining

20080041262 Naval Postgraduate School, Monterey, CA USA

Harmonized Constraints in Software Engineering and Acquisition Process Management Requirements are the Clue to Meet Future Performance Goals Successfully in an Environment of Scarce Resources

Reich, Holger; Jun 2008; 75 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483497; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This MBA project investigates the importance of correctly deriving requirements from the capability gap and operational environment, and translating them into the processes of contracting, software and hardware design, system engineering, the acquisition cycle, and program management. The research also examines inefficiencies in hardware and software development, acquisition management, and problems caused by organizational, systemic and stakeholder interferences. The primary goal is achieving the acquisition process to deliver the best quality system that is prompt, technically available, affordable, and meets the user s requirements. The work addresses commonalities and differences of software and hardware development, inefficiencies, and a variety of influential factors for a new program from a more general perspective. The conclusions and recommendations illustrate the present difficulties of implementing constructive change. These recommendations are provide the reader with alternative approaches to consider. Suggestions for further research are included at the end of this research.

DTIC

Acquisition; Computer Programming; Engineering Management; Goals; Software Engineering

20080041275 Miami Univ., FL USA

HYCOM Coastal Ocean Hindcasts and Predictions: Impact of Nesting in HYCOM GODAE Assimilative Hindcasts

Halliwell, George R; Shay, Lynn K; Kourafalou, Villy; Chassignet, Eric P; Weisberg, Robert H; Barth, Alexander; Hurlburt, Harley E; Hogan, Patrick J; Smedstad, Ole M; Cummings, James A; Jan 2006; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N000140510892

Report No.(s): AD-A483529; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The overarching goal is to improve our capability to map, understand, and predict changes in currents and water properties in the coastal ocean. Providing real-time (nowcast) and future (forecast) coastal ocean fields requires a coastal ocean nowcast/forecast system that consists of several components: 1. a high-quality ocean general circulation model; 2. accurate surface flux (atmospheric forcing) fields to drive the ocean model; 3. accurate estimates of coastal ocean fields at the start of a model run and along the lateral boundaries of the coastal domain during model runs; 4. accurate estimates of freshwater input from rivers and estuaries; and 5. high-quality ocean observations. The observations are necessary to provide the accurate initial and boundary fields required by component (3) and to evaluate the performance of the nowcast/forecast system. The central focus of this project is component (3), specifically to quantify and understand the impact of initial and boundary fields on coastal ocean nowcasts and forecasts, and to provide feedback that will motivate improvements in generating these fields. We are evaluating initial and boundary fields provided by a nowcast/forecast system based on the HYbrid Coordinate Ocean Model (HYCOM) developed at the Naval Research Laboratory (NRL-Stennis) as part of the Global Ocean Data Assimilation Experiment (GODAE). Results are being communicated to NRL to guide improvement strategies for their nowcast/forecast

system. Although our central focus is on component (3), we also consider the other four components of the coastal nowcast/forecast system. We are striving to improve ocean model performance, evaluate model sensitivity to different atmospheric forcing products, study sensitivity to river runoff, and assess the adequacy of available coastal ocean observations. Coastal ocean simulations are also being analyzed to improve our scientific understanding of ocean variability observed in our region of interest.
DTIC
Coasts; Hindcasting; Ocean Currents; Ocean Models; Oceans

20080041276 Space and Naval Warfare Systems Center, San Diego, CA USA
A Vision System for an Unmanned, Non-lethal Weapon
Kogut, Greg; Drymon, Larry; Oct 2004; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483531; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Unmanned weapons remove humans from deadly situations. However some systems, such as unmanned guns, are difficult to control remotely. It is difficult for a soldier to perform the complex tasks of identifying and aiming at specific points on targets from a remote location. This paper describes a computer vision and control system for providing autonomous control of unmanned guns developed at Space and Naval Warfare Systems Center, San Diego (SSC San Diego). The test platform, consisting of a non-lethal gun mounted on a pan-tilt mechanism, can be used as an unattended device or mounted on a robot for mobility. The system operates with a degree of autonomy determined by a remote user that ranges from teleoperated to fully autonomous. The teleoperated mode consists of remote joystick control over all aspects of the weapon, including aiming, arming, and firing. Visual feedback is provided by near-real-time video feeds from bore-site and wide-angle cameras. The semi-autonomous mode provides the user with tracking information overlayed over the real-time video. This provides the user with information on all detected targets being tracked by the vision system. The user uses a mouse to select a target, and the gun automatically aims the gun at the target. Arming and firing is still performed by teleoperation. In fully autonomous mode, all aspects of gun control are performed by the vision system.
DTIC
Computer Vision; Robotics

20080041280 Naval Postgraduate School, Monterey, CA USA
A Preliminary Analysis for Porting XML-based Chat to MYSEA
LaVelle, Claire E; Jun 2008; 145 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483542; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Monterey Security Architecture (MYSEA) is a distributed multilevel secure (MLS) computing environment. MYSEA does not presently support chat, an Internet application that provides near-real-time collaboration capability. Chat capability that implements the Extensible Messaging and Presence Protocol (XMPP) standards has been recognized by the Department of Defense (DoD) as a mandatory standard. The primary goal of this thesis is to determine if a chat server that implements the XMPP and the XMPP Instant Messaging (XMPP-IM) standards could be ported to MYSEA. To accomplish this goal, a set of selection criteria was developed and the open-source jabberd14 server was selected for this study. Its functionality was tested on different operating system environments (Fedora 7, RedHat 8, STOP OS 7 beta). This study also includes a functional analysis of the XMPP and XMPP-IM specifications, the related XMPP extensions supported by the jabberd14 server, a preliminary security analysis and a survey of the jabberd14 server code. The results of this project show that implementation of the XMPP jabberd14-1.6.0 server on the MYSEA platform under STOP 7 OS is feasible. The results also provide stepping stones toward a full-scale development effort to provide MLS-aware chat services in the MYSEA network.
DTIC
Client Server Systems; Document Markup Languages

20080041289 Naval Postgraduate School, Monterey, CA USA
Adaptive Architecture for Command and Control (A2C2) Experiment 11: Determining an Effective ISR Management Structure at the Operational Level of Conflict
Halbert, Germaine E; Stockton, Daniel W; Jun 2008; 147 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483568; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This thesis on Experiment 11 concentrates on two conditions of the main independent variable: the position of the ISR Officer. Analysis compares different performance variables under the two ISR role structures. Condition I is comprised of an ISR Coordinator (ISR Coord), a Sea Combat Commander (SCC) and a Marine Expeditionary Unit Commander (MEU).

Condition II is comprised of an ISR Commander (ISR Cdr), an SCC and a MEU. Both ISR Officer conditions are examined in a HA/DR scenario. The assessment of performance includes responsiveness of the two conditions when assets are reduced. Participants were asked to plan for the allocation of ISR assets and then re-plan when assets were reduced. Thus, this experiment also examines the simulator as input for operational-level planning. This thesis also compares the findings from Experiment 11 with the findings from Experiment 10 to determine if the ISR management structure, reduction in assets and incorporated planning process in Experiment 11 to determine how the ISR management structure in Experiment 11 affected the utilization of ISR assets.
DTIC
Adaptation; Architecture (Computers); Command and Control

20080041290 Naval Postgraduate School, Monterey, CA USA
Cargo Throughput and Survivability Trade-Offs in Force Sustainment Operations
Sumsion, William J; Jun 2008; 75 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483569; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Force sustainment requires an optimum supply of resources to maintain and project power in an area. With sustainment reaching ever farther from the origin of supplies, commanders find an increasing exposure of their logistic trains to risk. To mitigate the increased risk from hostile forces, the survivability of supply vehicles must be considered in force sustainment operations to accurately capture a true throughput projection. Development of an optimum throughput plan for littoral sustainment will reduce overall risk to supplies and maximize throughput to the war-fighter. The research conducted focused on maximizing throughput considering the size, quantity, and risk to the cargo vehicles traversing the littoral arena. The major risk component studied is comprised primarily of littoral mines, though this risk is comparable to many other survivability situations. Use of data collected from computer modeling programs are used to compute and maximize throughput.
DTIC
Cargo; Tradeoffs

20080041291 Naval Postgraduate School, Monterey, CA USA
Implementing an Intrusion Detection System in the Mysea Architecture
Tenhunen, Thomas; Jun 2008; 169 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483571; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Monterey Security Architecture (MYSEA) supports a multilevel secure (MLS) network and a number of single level networks at different classification levels. The MYSEA MLS server is the focus of policy enforcement. It implements a Dynamic Security Services mechanism (DSS) that can modulate IPsec security attributes and MYSEA security services based upon administrator choices. Use of intrusion detection technology on the unprotected single level networks can provide administrators with actionable information to inform DSS choices. The objective of this thesis is to design an intrusion detection system (IDS) architecture that permits administrators operating on MYSEA client machines to conveniently view and analyze IDS alerts from the single level networks. A progressive set of analyses and experiments was conducted that led to a working implementation of an IDS for MYSEA. Sensors are located on the single level networks. Their alerts are fed into the MLS server, where single level databases are used to store and organize the data. Administrators can login from the MLS LAN and examine IDS results, which may be used to derive new DSS policies. A testing methodology was developed and functional tests were performed. Implementation considerations for future extensions of this work are presented.
DTIC
Architecture (Computers); Detection; Warning Systems

20080041296 Naval Postgraduate School, Monterey, CA USA
Optimal Jammer Placement to Interdict Wireless Network Services
Shankar, Arun; Jun 2008; 59 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483583; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The demand for wireless networks continues to grow as the need for portable, low-cost telecommunications systems increases around the world. Wireless networks are particularly complex because their topologies can change in response to operational requirements or environmental conditions and also because wireless networks are susceptible to electromagnetic interference. In this thesis, we consider the challenges associated with the operation and jamming of so-called wireless mesh networks. In a wireless mesh network, the communication devices (denoted here as a nodes) are uniform in their ability to send and receive transmissions. We formulate and solve two related optimization problems for wireless mesh networks. First,

we solve the problem of the network operator, namely: In order to maximize the utility of delivered network traffic, how should one set the power transmission levels for each node, and along what sequence of transmission links should the traffic flow? The second problem we consider involves an intelligent adversary, the attacker, who wants to place jamming devices among a finite number of locations to disrupt the operator's traffic in the worst possible way. We formulate and solve mathematical programs to obtain the optimal operation and jamming of these networks. We develop a computational decision-support tool that affords the rapid reconfiguration and analysis of various deployment scenarios.
DTIC
Jammers

20080041311 Naval Postgraduate School, Monterey, CA USA
An Automated Acquisition System for Media Exploitation
Bassi, Jr, Steven D; Jun 2008; 75 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DUE-0414102
Report No.(s): AD-A483619; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This thesis explores the requirements for building a highly usable acquisition system for an automated document and media exploitation system and presents work to date on AcqMan, an acquisition manager written in Java which uses DBUS and the Hardware Abstraction Layer (HAL) to automatically detect device insertion and start forensic imaging.
DTIC
Data Processing; Exploitation

20080041313 Naval Postgraduate School, Monterey, CA USA
Modeling Methodologies for Representing Urban Cultural Geographies in Stability Operations
Ferris, Todd P; Jun 2008; 153 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483623; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This thesis addresses Department of Defense (DoD) Modeling and Simulation (M&S) deficiencies in military and organizational societal modeling methods. These deficiencies are even more important today due to Stability Operations being an extremely prevalent mission for U.S. forces in this century. Research efforts in this thesis focused on the implementation of three analytic social theory models into the agent-based model (ABM) Pythagoras 2.0.0, in an effort to provide modeling methodologies for a single simulation tool capable of exploring the complex world of urban cultural geographies undergoing Stability Operations in an irregular warfare (IW) environment. While the individual model mappings proved to be somewhat difficult, the consolidation of all three model mappings into Pythagoras 2.0.0 proved to be infeasible with respect to capturing accurate attitudinal shifts. Civilian populaces attitudinal shifts are functions of issues believed important by the various subpopulations comprising the civilian populaces, experienced influences, economic security, and influence exchange across social networks. With the use of simulation, statistical analysis, and cultural and societal modeling, this thesis identifies a major limitation causing significant attitude representation errors within the Pythagoras modeling environment; there is currently no direct link between experienced influences and attitudinal shifts. Funding has been allotted by TRACMonterey and the Marine Corps Combat Development Center (MCCDC) in Quantico, Virginia for Northrop Grumman to implement the recommended modifications provided from this research.
DTIC
Geography; Models; Stability

20080041314 Naval Postgraduate School, Monterey, CA USA
Increasing Open Source Software Integration on the Department of Defense Unclassified Desktop
Schearer, Steven A; Jun 2008; 89 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483625; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The USA Department of Defense (DoD) spends hundreds of millions of dollars each year on desktop computer software. While some of this expenditure goes to fund special-purpose military software, much of it is absorbed by license fees for computer operating systems and general-purpose office automation applications. Although many of these tools may serve their respective purposes rather well, there are many reasons to consider adopting alternative software solutions alongside the existing standards. Improvements to cost, security, and flexibility are some of the benefits that may be realized by integrating some of the many available mature, robust Open Source Software (OSS) solutions. In particular, Linux-based operating systems have helped bring free, open source software into mainstream use in businesses, homes, and government offices around the world, precisely because of these potential benefits. This thesis examines the feasibility of using OSS, particularly

Linux-based operating systems, on unclassified DoD desktop computers. Specific attention is paid to performing office automation tasks that are currently handled by U.S. Air Force Secure Desktop Configuration, Windows-based computers. Additionally, this document examines many of the regulations and policies that shape the procurement and operational environments in which OSS must compete and function.
DTIC
Computers; Defense Program; Microcomputers; Open Source Licensing (Computers); Unix (Operating System)

20080041318 Naval Postgraduate School, Monterey, CA USA
An Analysis of Related Software Cycles Among Organizations, People and the Software Industry
Moore, Robert; Adams, Brady; Jun 2008; 89 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483638; No Copyright; Avail.: Defense Technical Information Center (DTIC)

There is a need to understand cycles associated with software upgrades as they effect people, organizations and the software industry. This thesis intends to explore the moderating factors of these three distinct and disjointed cycles and propose courses of action towards mitigating various issues and problems inherent in the software upgrade process. This thesis will acknowledge that three related but disjointed cycles are common in many software upgrade ventures in today's organizations: a. End-user characteristics in adapting to new software b. Organizational ability to adopt new software c. The software industry's motivation and processes in introducing new software Realizing the importance of these related cycles involves developing an understanding of several aspects we research in this study. First, awareness in understanding why users adopt new software and the demographic factors involved, such as gender, age and experience are considered. Second, we present how organizations integrate new software by exploring factors such as cost, time, reliability and benefit analysis. Last, we provide evidence supporting motivating forces and factors behind software introduction rates within the software industry. These important aspects together culminate in cyclical phenomenon managers and executives need to be aware of, as implementing new software upgrades have become an inevitable undertaking in most of today's organizations.
DTIC
Computer Programming; Cycles; Industries; Organizations; Software Engineering

20080041325 Naval Postgraduate School, Monterey, CA USA
Implications of Services-Oriented Architecture and Open Architecture Composable Systems on the Acquisition Organizations and Processes
Brummett, Cory S; Finney, Benjamin H; Jun 2008; 95 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483647; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The U.S. Navy is interested in acquiring systems that promote the use of Services-oriented Architecture (SOA) and Open Architecture (OA) in Integrated Warfare Systems (IWS). The number of systems required to share data and provide reliable information in weapons systems is growing. Many systems, systems-of-systems and families of systems with different software architectures are acquired and often have difficulty operating together, which causes delays, increases costs, and limits re-use. Intelligent adoption of SOA and OA may help solve integration and reuse issues in current and future acquisition programs. The commercial market is successfully beginning to implement SOA and OA in their processes and may provide examples of best practices that can be applied to the Defense Acquisition System. The goal of this thesis is to explore the feasibility of implementing SOA and OA into the Defense Acquisition System. Adoption of SOA and OA practices is not expected to completely alter the current Defense Acquisition System; instead, it is intended to alleviate some of its constraints. This thesis will focus on utilizing SOA and OA in IWS, how SOA and OA principles relate, and the effects they will have on the Defense Acquisition System s organizations and processes.
DTIC
Acquisition; Organizations; Systems Integration

20080041326 Naval Postgraduate School, Monterey, CA USA
A Merit-Based Architecture for the Automatic Selection and Composition of Services in SOA-Based C4ISR Systems
Cook, Thomas S; Jun 2008; 177 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483650; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Department of Defense (DoD) Command and Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems are responsible for supplying the right information at the right time to the warfighter. This dissertation presents a methodology for automating and realizing time-critical C4ISR applications. We introduce World Wide Web Consortium (W3C) compliant services into the planning and battle management processes where a computer can be more

efficient and more effective than a human operator. We demonstrate our approach using ballistic missile defense (BMD) as a case study of a system in which the software services comprising the command, control, and battle management (C2BM) element of the BMD system need to operate within hard real-time constraints. We show the realization of time-critical C4ISR applications via continuously orchestrating individual services based on the automatically processing operational orders (OPORDs) and reports for the system to self-regulate itself. The system monitors, selects, and composes sub-services using a merit-based score until the mission stated in the OPORD is complete. The processing of the OPORDs for use by the C2BM element initiates and preserves the cyclic process of the kill chain used to negate threat ballistic missiles. To select and orchestrate services at runtime, we extended the current Web Services Description Language (WSDL) standard to encompass measures of performance (MOP) and measures of effectiveness (MOE). In our approach the WSDL-advertised measures are continuously updated based on runtime monitoring, creating an historical basis-of-confidence for each of the services. We demonstrate the generation and use by the C2BM of continuously updating service-selection criteria. Our composition language includes a software design pattern for use in ensuring time-critical processes complete within their time budget.
DTIC
Command and Control; Computer Programming; Software Engineering

20080041330 Naval Postgraduate School, Monterey, CA USA
Internet Topology Generation Based on Reverse-Engineered Design Principles: Performance Tradeoffs Between Heuristic and Optimization-Based Approaches
Derosier, Jonathan A; Jun 2008; 91 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483654; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The global Internet is a federation of computer networks that are owned and operated by Internet Service Providers (ISPs). Because ISPs do not share topology information for competitive and privacy reasons, researchers, operators, and policy makers who want to assess the performance and reliability of the system as a whole must infer structure from limited measurement data. We use reverse-engineering to infer underlying design principles of a national ISP and then develop models capable of generating ISP topologies ranging from regional to national scales. We contrast the behavior of optimal versus heuristic designs in terms of cost and performance. Unlike previous approaches that simply replicate observed network connectivity statistics, our approach yields networks that reflect the technological capabilities, economic constraints, operational requirements, and performance objectives faced by real ISPs. We complement our mathematics with computational tools that facilitate this network generation and analysis. To our knowledge, this thesis represents the first effort to incorporate these modeling principles in a process capable of generating realistic ISP networks at the national scale.
DTIC
Heuristic Methods; Internets; Networks; Topology; Tradeoffs

20080041331 Carnegie-Mellon Univ., Pittsburgh, PA USA
A Performance Comparison of On-Demand Multicast Routing Protocols for Ad Hoc Networks
Jetcheva, Jorjeta G; Johnson, David B; Dec 15, 2004; 21 pp.; In English
Contract(s)/Grant(s): F19628-96-C-0061
Report No.(s): AD-A483655; CMU-CS-04-176; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In this paper, we present a comparative performance evaluation of three general-purpose on-demand multicast protocols, namely ADMR, MAODV, and ODMRP, focusing on the effects of changes such as increasing number of multicast receivers or sources, application sending pattern, and increasing number of nodes in the network. We use mobile networks composed of 100 or 200 nodes, with both a single active multicast group and multiple active multicast groups in the network, in a wide range of multicast scenarios. Although some simulation results for these protocols have been published before, the three protocols have not been compared, and prior studies have focused on smaller networks using a small set of simulation scenarios, many with only a single active multicast group. We focus here on the effects of the protocols' relative degree of on-demand behavior and their performance in different multicast scenarios.
DTIC
Protocol (Computers)

20080041335 Naval Postgraduate School, Monterey, CA USA
An Ontological Approach to Developing Information Operations Applications for use on the Semantic Web
Clarke, Timothy L; Sep 2008; 149 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483661; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Information Operations (IO) have the potential to alter the landscape of modern warfare through the sustained application

of a broad spectrum of kinetic and non-kinetic effects. Operations of this type offer the benefit of reducing the scope of direct conflict by shaping the perceptions of a potential adversary. The complexity and diversity of IO makes it an ideal beneficiary of software applications, but current systems have yet to truly leverage domain expertise in systems development. By expressing IO capabilities in a formal ontology suitable for use on the Semantic Web, conditions are set such that computational power can more efficiently be leveraged to better define required capabilities and more reliably predict effects. The purpose of this thesis is to identify gaps in existing IO software applications, demonstrate how IO capabilities may be represented in a software ontology, and develop a process by which an IO ontology may be adapted for use on the Semantic Web. These objectives are accomplished by examining leading IO applications, demonstrating a process for converting the IO problem domain into an ontology using the Protege 3.3 Ontology Editor, and assessing the suitability of the ontology for use on the Semantic Web.
DTIC
Software Development Tools; Warfare

20080041363 Naval Postgraduate School, Monterey, CA USA
Authorship Discovery in Blogs Using Bayesian Classification with Corrective Scaling
Gehrke, Grant T; Jun 2008; 51 pp.; In English
Report No.(s): AD-A483774; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Widespread availability of free, public blog platforms has facilitated growth in the amount of individually written electronic text available online. Our research leverages an extremely large blog corpus for a study in authorship discovery, both to evaluate a traditional technique as applied to blogs, as well as to demonstrate the implications of authorship discovery in blogs for intelligence and forensic purposes. Our study uses a Bayesian classifier with two important extensions. First, we introduce a postclassification corrective scaling technique to mitigate the over-classification of many samples to a few authors. Second, we propose an n-percent-correct threshold metric, whereby we define a correct result as one where the true author is within some small subset of the original search space rather than requiring that he or she be the single most probable author. Using this technique, we are able to reduce a search space of 2000 authors to 1% of its original size with 91% accuracy when 1000 bigrams are present, or reduce the search space to 10% of its original size with 94% accuracy when only 500 bigrams are present.
DTIC
Bayes Theorem; Classifications; Internets; Natural Language (Computers)

20080041576 NATO Research and Technology Organization, Neuilly-sur-Seine, France
Computer Based Decision Support Tool for Helicopter Mission Planning in Disaster Relief and Military Operations
June 2008; 298 pp.; In English; Original contains color illustrations
Report No.(s): RTO-TR-SAS-045; AC/323(SAS-045)TP/52; Copyright; Avail.: CASI: C01, CD-ROM: A13, Hardcopy

The SAS-045 study group was formed to propose a framework for a generic and flexible decision support tool that can be used in effective management of helicopter missions both during humanitarian and military operations. This report provides an in-depth discussion of the research process executed by the team and the output of each of those modules. A problem analysis module provides the operational context, mission types, and the decision-making framework. A concept of solutions module presents the mathematical modeling description, the resolution method, and computational results on testing scenarios. Finally, the technical requirements module describes the information management system, database interfacing module, and the protocols and, as well, the information support tool dependencies are defined.
Author
Decision Support Systems; Mission Planning; Military Operations; Disasters; Computer Programs; Architecture (Computers)

20080041718 Wisconsin Univ., Madison, WI USA
Multidimensional Modeling of Fuel Composition Effects on Combustion and Cold-starting in Diesel Engines
Ayoub, Nabil S; Reitz, Rolf D; Jan 1995; 12 pp.; In English
Contract(s)/Grant(s): DAAH04-94-G-0328
Report No.(s): AD-A484065; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484065

A computer model developed for describing multicomponent fuel vaporization, and ignition in diesel engines has been applied in this study to understand cold-starting and the parameters that are of significant influence on this phenomena. This research utilizes recent improvements in spray vaporization and combustion models that have been implemented in the

KIVA-II CFD code. Typical engine fuels are blends of various fuels species, i.e., multicomponent. Thus, the original single component fuel vaporization model in KIVA-II was replaced by a multicomponent fuel vaporization model (based on the model suggested by Jin and Borman). The model has been extended to model diesel sprays under typical diesel conditions, including the effect of fuel cetane number variation. Necessary modifications were carried out in the atomization and collision sub-models. The ignition model was also modified to account for fuel composition effects by modifying the Shell ignition model. The improved model was applied to simulate diesel engine cold-starting. The effect of fuel residual from previous cycles was studied and was found to be important. Other injection parameters, such as injection timing and duration were also studied. Another factor that was investigated was engine geometry and how it can be modified to improve on cold-starting in diesel engines. Cold-starting was found to be enhanced by the presence of a small fuel vapor residual and by a shorter injection duration, while engine geometry modifications were found to be helpful in selecting an optimum location on the cylinder head for an ignition aid.
DTIC
Combustion; Computerized Simulation; Diesel Engines; Fuel Combustion; Fuels

20080041819 Army Research Lab., Aberdeen Proving Ground, MD USA
Investigation of Small-Caliber Primer Function Using a Multiphase Computational Model
Schmidt, John R; Nusca, Michael J; Jul 2008; 36 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484175; ARL-TR-4514; No Copyright; Avail.: Defense Technical Information Center (DTIC)
This report describes further development in the formulation of a primer model that is compatible with the ARL-NGEN3 code and small caliber weapons that takes in account multidimensional, multiphase interior ballistics codes, which employ coupled Eulerian-Lagrangian schemes to explicitly treat both the gas and solid phase. The model is based on the One Dimensional Turbulence modeling approach that has recently emerged as a powerful tool in multiphase simulations. Initial results are shown for the model run as a stand-alone code and are compared to recent experiments with small-caliber primers. Integration of the primer model with the Army's ARL-NSRG computational fluid dynamics code is presented and the results are compared to experiments with small-caliber primers fired into empty test chambers. It is proposed that this further progress sets the stage for coupling the primer model to the ARL-NGEN3 code.
DTIC
Coding; Computational Fluid Dynamics; Interior Ballistics; Multiphase Flow

20080041827 Cooperative Computing and Communication Lab. (C-Lab), Paderborn, German Democratic Republic
Context-Awareness in Middleware for Mobile Networks
Eikerling, Heinz-Josef; Aug 2003; 22 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484190; No Copyright; Avail.: Defense Technical Information Center (DTIC)
No abstract available
Applications Programs (Computers); Networks

20080041866 Army Tank-Automotive and Armaments Command, Warren, MI USA
Final Project - Instruction Pipeline Simulation
Del Rose, Michael; Dec 2, 2000; 19 pp.; In English
Report No.(s): AD-A484280; TARDEC/VTA-TP-14203; No Copyright; Avail.: Defense Technical Information Center (DTIC)
This simulated pipeline is a simple model of an architecture that probably doesn't have much use in real applications. However, the idea of how a pipeline works and the complexity involved in designing an instruction pipeline was realized from this exercise. I tried to encompass all possible pipeline caveats into the three test programs. However, the program functionality was not completely tested for run time errors. I believe the purpose of this assignment was to evaluate the complexities of an instruction pipeline. The Appendixes A, B and C hold the test programs and their pipelines. Appendix D holds the main logic code for the pipelines. It may be a bit jumbled. This is due to the lack of knowledge that I have in programming, but I believe it is followable. The reader should be mainly concerned with the modules 'readthru4' and 'readthru5'. This is the main logic for a 4 stage and a 5 stage instruction pipeline. I deviated a bit from my final proposal of this project. I originally planned on having a variable clock value for each stage. I chose not to do this based on time. When I had first conceived the work involved in this project, I didn't intend on it taking the time that it did. Another change from my proposal was the stages that were available. To me, a 4 and a 5 stage pipeline seemed to make more sense than a 1, 2, or 3 stage pipeline. This is why I decided to do a 4 and 5 stage pipeline. In the table section of the program, you will notice

a ‘tblProg1’, ‘tblProg2’, ‘tblProg3’, and ‘tblProgram’ tables. The simulation looks at the ‘tblProgram’ table as its table to enter in code (or change code). the other three programs refer to the test programs 1, 2 and 3 respectively.
DTIC
Computer Programming; Computerized Simulation; Education; Pipelines; Simulation

20080041880 Army Research Lab., Adelphi, MD USA
An Introduction to Python (A One-Hour Tour)
Nguyen, Binh Q; Jul 2008; 20 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484316; ARL-TN-0328; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This tutorial highlights and goes over essential features of the Python programming language while it is still evolving, but sufficiently stable and mature for the development of diverse solutions to computational, networking, and visualization problems. Although the technical details are kept to a minimum to fit diverse background and interests of the audience, they can be used as review materials for experienced and occasional developers of Python applications. The tutorial was presented to a team of engineers, scientists, and summer students on Wednesday 18 June 2008 at the U.S. Army Research Laboratory in Adelphi, MD.
DTIC
Computer Networks; Programming Languages

20080041916 Naval Postgraduate School, Monterey, CA USA
Language Issues in Mobile Program Security
Volpano, Dennis; Smith, Geoffrey; Jan 1998; 20 pp.; In English
Contract(s)/Grant(s): CCR-9612176; CCR-9612345
Report No.(s): AD-A484462; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Many programming languages have been developed and implemented for mobile code environments. They are typically quite expressive. But while security is important aspect of any mobile code technology, it is often treated after the fundamental design is complete, in ad hoc ways. In the end, it is unclear what security guarantees can be made for the system. We argue that mobile programming languages should be designed around certain security properties that hold for all well-formed programs. This requires a better understanding of the relationship between programming language design and security. Appropriate security properties must be identified. Some of these properties and related issues are explored.
DTIC
Computer Programs; Programming Languages; Security

20080041917 Naval Postgraduate School, Monterey, CA USA
Policy-Enhanced Linux
Clark, Paul C; Oct 2000; 13 pp.; In English
Report No.(s): AD-A484465; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Graduates from the various computer fields need to have a better education in the area of computer security problems and their solutions. In particular, there appears to be little exposure to the enforcement of non-discretionary or Mandatory Access Control (MAC) policies in automated systems. One cause of this deficiency is the expense, limited availability, and limited functionality of operating systems that support such policies. This paper provides a detailed description of an effort to modify the Linux operating system to support MAC policies and overcome these obstacles, with the hope that it can be used to improve computer security education.
DTIC
Access Control; Computer Information Security; Education; Policies; Programming Languages; Unix (Operating System)

20080041918 Naval Postgraduate School, Monterey, CA USA
Probabilistic Noninterference in a Concurrent Language
Volpano, Dennis; Smith, Geoffrey; Jun 1998; 13 pp.; In English
Contract(s)/Grant(s): CCR-9612176; CCR-9612345
Report No.(s): AD-A484466; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In, we give a type system that guarantees that well-typed multi-threaded programs are possibilistically noninterfering. If thread scheduling is probabilistic, however, then well-typed programs may have probabilistic timing channels. We describe how they can be eliminated without making the type system more restrictive. We show that well-typed concurrent programs

are probabilistically noninterfering if every total command with a high guard executes atomically. The proof uses the concept of a probabilistic state of a computation, following the work of Kozen.
DTIC
Probability Theory; Programming Languages

20080041919 Florida International Univ., Miami, FL USA
Secure Information Flow in a Multi-threaded Imperative Language
Smith, Geoffrey; Volpano, Dennis; Jan 1998; 11 pp.; In English
Contract(s)/Grant(s): CCR-9612176; CCR-9612345
Report No.(s): AD-A484468; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Previously, we developed a type system to ensure secure information flow in a sequential, imperative programming language [VS196]. Program variables are classified as either high or low security; intuitively, we wish to prevent information from flowing from high variables to low variables. Here, we extend the analysis to deal with a multithreaded language. We show that the previous type system is insufficient to ensure a desirable security property called noninterference. Noninterference basically means that the final values of low variables are independent of the initial values of high variables. By modifying the sequential type system, we are able to guarantee noninterference for concurrent programs. Crucial to this result, however, is the use of purely nondeterministic thread scheduling. Since implementing such scheduling is problematic, we also show how a more restrictive type system can guarantee noninterference, given a more deterministic (and easily implementable) scheduling policy, such as round-robin time slicing. Finally, we consider the consequences of adding a clock to the language.
DTIC
Information Flow; Programming Languages

20080041921 Naval Postgraduate School, Monterey, CA USA
Goals for Computer Security Education
Irvine, Cynthia E; May 1996; 3 pp.; In English
Report No.(s): AD-A484472; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Until recently, most of those involved in research, development and operation of secure computing systems have been either autodidacts or individually mentored by people already working in the field. Today's practitioners learned computer security as it was growing up around them. Security concerns have created an increased demand for computer security professionals. Students want to learn about computer security and potential employers want graduates who can go to work solving their problems. We, the members of the computer security community, must be responsible for producing the next generation of computer security experts. The objective of this panel is to present and discuss the opinions of people who hire computer science graduates to work on computer security problems. Thus, the panel seeks not to have computer security educators tell the audience what they are teaching, but to have employers tell us what needs to be taught.
DTIC
Computer Information Security; Education

20080041924 Naval Postgraduate School, Monterey, CA USA
Security Architecture for a Virtual Heterogeneous Machine
Wright, Roger; Shifflett, David J; Irvine, Cynthia E; Jan 1998; 12 pp.; In English
Report No.(s): AD-A484477; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We describe security for a virtual heterogeneous machine (VHM). Our security architecture is based upon separation of services into four distinct domains. It is designed to take advantage of operating system support for domains, where available. We have chosen to use emerging public key technology as an interim solution to provide domain separation. A prototype demonstration of our architecture has been developed.
DTIC
Architecture (Computers); Heterogeneity; Security

20080042017 Georgia Inst. of Tech., Atlanta, GA USA

Preventing SQL Code Injection by Combining Static and Runtime Analysis

Orso, Alessandro; Lee, Wenke; Shostack, Adam; May 2008; 68 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8750-05-2-0214; Proj-DHSD

Report No.(s): AD-A483186; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483186

Many software systems have evolved to include a Web-based component that makes them available to the public via the Internet and can expose them to a variety of Web-based attacks. One of these attacks is SQL injection, which can give attackers unrestricted access to the databases underlying Web applications and has become increasingly frequent and serious. In this project, we developed techniques and tools to detect, prevent, and report SQL injection attacks. Our techniques leverage static and dynamic analysis, are effective and efficient, and have minimal deployment requirements. Given a previously developed Web application, our tools automatically transform the application into an equivalent application that is protected from SQL injection attacks. In the project, we also developed a testbed that can be used to evaluate SQL injection detection and prevention tools. Our testbed has been used extensively both by us and by other organizations. The tools and techniques developed within the project are being disseminated through different channels and are currently being commercialized by our industrial partner.

DTIC

Computer Information Security; Computer Programs; Injection; Internets; Programming Languages

20080042044 Naval Postgraduate School, Monterey, CA USA

Representing Urban Cultural Geography in Stabilization Operations: Analysis of a Social Network Representation in Pythagoras

Seitz, Thorsten; Jun 2008; 125 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483609; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Civilian human behavior representation is the most significant gap in representing political, military, economic, social, information and infrastructure aspects of the operational environment in urban operations. We consider three analytical models for different aspects of population dynamics, and explore whether they can be implemented in the Pythagoras 2.0.0 agent-based combat simulation software. These analytic models are an attitudinal effect model, a social network model, and an economic model. This study shows that the transfer of simple analytic models into an advanced simulation software platform can bring unpredictable difficulties. A detailed investigation reveals the strengths and weaknesses of this advanced software, and shows that the current version of Pythagoras is not capable of adequately mapping all three human behavior models. The thesis recommends code changes to overcome these limitations and points out ways to improve Pythagoras ability to represent human behavior, so it can be used by the U.S. Army and Marine Corps for more sophisticated analyses of stabilization operations. The ultimate goal is to provide decision makers with tools to help them make better decisions regarding stabilization operations and other issues critical to global security.

DTIC

Combat; Computer Programs; Geography; Models; Simulation; Warfare

20080042121 Naval Postgraduate School, Monterey, CA USA

On the Systematic Design of Web Languages

Volpano, Dennis; Smith, Geoffrey; Jun 1996; 4 pp.; In English

Report No.(s): AD-A484193; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The emergence of 'web languages,' such as Java, support the development of programs that can be downloaded to a client's machine for execution by a web browser. This brings power and flexibility to web applications, but it also brings well-known end-point security problems, such as the threat of integrity and unauthorized disclosure attacks. Yet although security has been an issue in web language design, there appears to be no formal characterization of the kinds of security properties that one can expect of programs written in these languages. A web language should be designed so that all programs are guaranteed to satisfy explicitly stated security properties. To this end, the authors advocate a more systematic approach to the design of secure web languages. One begins with a core language for which some set of desired security properties can be shown to hold with respect to a formal semantics. The language is then incrementally extended to include new features, as necessary. At each step, the designer has an obligation to establish that the security properties have been preserved. For example, one kind of attack a web language should guard against is a disclosure attack, where a malicious program downloaded by a client attempts to make the contents of certain private files public. There is a form of static analysis that can be applied to programs to protect against disclosure attacks while allowing utilities like mail tools to access files and

directories at different sensitivity levels. It is called 'secure information flow' analysis. The authors briefly describe how a type system can be imposed on a simple imperative language to guarantee secure information flow. In part, they illustrate how well type theory can be applied to address a security problem, but their main point is that the security theorem stated here actually guides the language designer in evaluating potential language extensions.
DTIC
Computer Information Security; Computer Programming; Design Analysis; Information Flow; Internets; Languages; Programming Languages; Security

20080042188 Air Force Research Lab., Eglin AFB, FL USA
High-Bandwidth Measurement and Validation of Bar and Plate Dynamics
Foley, Jason; Dodson, Jacob; Schmidt, Martin; Gillespie, Preston; Besonia, Yasmin; Jun 4, 2008; 33 pp.; In English
Report No.(s): AD-A484340; AFRL-RW-EG-TP-2008-7415; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Air Force Research Laboratory Munitions Directorate (AFRL/RW) is performing a series of studies to validate the ability of codes to accurately predict the impulse response of simple mechanical structures, i.e., impact-loaded bars and plates, over a wide frequency range. The modal responses of both structures are predicted using finite element codes and simple analytic calculations. An experiment on isolated (i.e., free-free) structures using impulse hammers as the excitation is described. The outputs of high bandwidth strain gages and accelerometers monitor the elastic wave propagation in the structures. The corresponding frequency-domain characteristics (e.g., the power spectral density of each sensor as well as the transfer functions between them) are measured over a wide frequency range in a cylindrical bar. Leakage is found to significantly reduce sensor coherence over a broad spectral band. Use of an exponential window restores the coherence in the original signal, leading to a broadband coherence below 10 kHz, but this approach broadens the modal peaks observed and introduces errors in damping estimates. The initial results from an ongoing effort to characterize the modal response of a hanging plate are also presented.
DTIC
Plates (Tectonics); Software Development Tools

20080042191 Naval Postgraduate School, Monterey, CA USA
Performance Impact of Connectivity Restrictions and Increased Vulnerability Presence on Automated Attack Graph Generation
Cullum, James; Irvine, Cynthia; Levin, Tim; Mar 2007; 15 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483843; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483843

The current generation of network vulnerability detection software uses databases of known vulnerabilities and scans target networks for these weaknesses. The results can be voluminous and difficult to assess. Thus, the success of this technology has created a need for software to aid in network vulnerability analysis. Although research has shown the effectiveness of automated attack graph generation tools in displaying potential attack paths in a network, research involving the performance of these tools has been limited. The performance impact of connectivity restrictions and the number of vulnerabilities present on a network for these tools is not well understood. Using empirical testing, we have collected quantitative data using CAULDRON, an attack graph generation tool developed at George Mason University, on a collection of simulated networks defined to modulate connectivity at certain points in our networks and represent the number of vulnerabilities present per node. By defining our model to include sets of nodes, which allow connectivity from all nodes to all vulnerable nodes in the set; the number of nodes present in each set, the number of connections between sets; and the number of vulnerabilities per node as our variables, we are able to observe the performance impact on CAULDRON of both connectivity restrictions and the increased presence of vulnerabilities in our networks. The effect of these variables on processing time and memory usage is presented and can be used as a metric to assess the scalability of this tool within various customer environments.
DTIC
Computer Programs; Vulnerability

20080042226 Army Engineer Research and Development Center, Vicksburg, MS USA

Southeast Oahu Coastal Hydrodynamic Modeling with ADCIRC and STWAVE

Cialone, Mary A; Brown, Mitchell E; Smith, Jane M; Hathaway, Kent K; Jul 2008; 61 pp.; In English; Original contains color illustrations

Report No.(s): AD-A484274; ERDC/CHL-TR-08-9; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This study provides the Honolulu District (POH) with numerical modeling tools for understanding nearshore circulation and sediment transport for Southeast Oahu (SEO). Circulation and wave models are developed and validated for this region and can be applied to assess sediment transport potential for various forcing conditions and to determine the likelihood of accretional and erosional areas within the model domain. Application of a wave model includes the generation of a wave climate. In the wave climate development technique, nearshore conditions are extracted from the wave model results for each simulation. A transformation correlation between the offshore and nearshore condition is then determined for each simulation. By applying the appropriate transfer function to each wave condition in the offshore time series, a long-term nearshore time series is generated. The nearshore time series demonstrates that there is a reduction in wave height from the offshore location to the nearshore location, landward of the extensive reef system as expected. The technique of developing a nearshore wave climate by applying the wave model for a range of offshore wave conditions provides a permanent 'look up' table of nearshore wave conditions at any location in the Honolulu District (POH) with numerical computational domain and can be applied to any time period for which offshore data are available, provided that bathymetric conditions within the model domain remain similar. POH is applying the database-generated time series to develop sediment transport potential estimates in the project area. Development of a bottom friction capability in the wave model was completed for application extensive reefs in the SEO study area. It is shown that bottom friction is extremely important and has a pronounced effect on modeling transformation over reefs, decreasing wave heights from the without-friction condition by 71-76% for a constant JONSWAP bottom friction value of 0.05.

DTIC

Coasts; Models; Sediment Transport

20080042330 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Technology Infusion of CodeSonar into the Space Network Ground Segment (RII07): Software Assurance Symposium Technical Summary

Benson, Markland J.; September 08, 2008; 18 pp.; In English; Software Assurance Symposium (SAS)/NASA Software Assurance Research Project (SARP), 8-12 Sep. 2008, Morgantown, WV, USA; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080042330

Presents a source code analysis tool (CodeSonar) for use in the Space Network Ground Segment. The Space Network requires 99.9% proficiency and 97.0% availability of systems. Software has historically accounted for an annual average of 28% of the Space Network loss of availability and proficiency. CSCI A and CSCI B account for 42% of the previous eight months of software data loss. The technology infusion of CodeSonar into the Space Network Ground segment is meant to aid in determining the impact of the technology on the project both in the expenditure of effort and the technical results of the technology. Running a CodeSonar analysis and performing a preliminary review of the results averaged 3.5 minutes per finding (approximately 20 hours total). An additional 40 hours is estimated to analyze the 37 findings deemed too complex for the initial review. Using CodeSonar's tools to suppress known non-problems, delta tool runs will not repeat findings that have been marked as non-problems, further reducing the time needed for review. The 'non-interesting' finding rate of 70% is a large number, but filtering, search, and detailed contextual features of CodeSonar reduce the time per finding. Integration of the tool into the build process may also provide further savings by preventing developers from having to configure and operate the tool separately. These preliminary results show the tool to be easy to use and incorporate into the engineering process. These findings also provide significant potential improvements in proficiency and availability on the part of the software. As time-to-fix data become available a better cost trade can be made on person hours saved versus tool cost. Selective factors may be necessary to determine where best to apply CodeSonar to balance cost and benefits.

Derived from text

Software Engineering; Error Detection Codes; Coding; Computer Programming; Computer Programs; Software Reliability; Program Verification (Computers); Software Development Tools; Ground Support Equipment; Technology Assessment

20080042409 NASA Ames Research Center, Moffett Field, CA, USA

AutoBayes Program Synthesis System Users Manual

Schumann, Johann; Jafari, Hamed; Pressburger, Tom; Denney, Ewen; Buntine, Wray; Fischer, Bernd; September 2008; 151 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): NNA07BB97C; 640337.04.01.02

Report No.(s): NASA/TM-2008-215366; Copyright; Avail.: CASI: A08, Hardcopy

Program synthesis is the systematic, automatic construction of efficient executable code from high-level declarative specifications. AutoBayes is a fully automatic program synthesis system for the statistical data analysis domain; in particular, it solves parameter estimation problems. It has seen many successful applications at NASA and is currently being used, for example, to analyze simulation results for Orion. The input to AutoBayes is a concise description of a data analysis problem composed of a parameterized statistical model and a goal that is a probability term involving parameters and input data. The output is optimized and fully documented C/C++ code computing the values for those parameters that maximize the probability term. AutoBayes can solve many subproblems symbolically rather than having to rely on numeric approximation algorithms, thus yielding effective, efficient, and compact code. Statistical analysis is faster and more reliable, because effort can be focused on model development and validation rather than manual development of solution algorithms and code.
Author

User Manuals (Computer Programs); C++ (Programming Language); Statistical Analysis; Systems Analysis; Probability Theory; Parameter Identification; Bayes Theorem

20080042416 NASA Langley Research Center, Hampton, VA, USA

Safety Case Notations: Alternatives for the Non-Graphically Inclined?

Holloway, C. M.; October 20, 2008; 6 pp.; In English; 3rd International Conference on System Safety, 20-22 Oct. 2008, Birmingham, UK; Original contains black and white illustrations

Contract(s)/Grant(s): WBS 457280.02.07.07.08; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080042416

This working paper presents preliminary ideas of five possible text-based notations for representing safety cases, which may be easier for non-graphically inclined people to use and understand than the currently popular graphics-based representations.
Author

Safety; Texts; Information; Visual Perception; Annotations; Alternatives; Verbal Communication

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COMPUTER SYSTEMS

Includes computer networks and distributed processing systems. For information systems see *82 Documentation and Information Science*. For computer systems applied to specific applications, see the associated category.

20080041096 Princeton Univ., NJ USA

Balancing Transport and Physical Layers in Wireless Ad Hoc Networks: Jointly Optimal Congestion Control and Power Control

Chiang, Mung; Jun 3, 2004; 19 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483210; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483210

No abstract available

Balancing; Congestion; Optimal Control; Protocol (Computers)

20080041149 Johns Hopkins Univ., Laurel, MD USA

An Integrated Coastal Wireless Network: 2004 End-of-Year Interim Report

Nichols, Robert; Jan 2004; 7 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-04-C-0216

Report No.(s): AD-A483349; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483349

The goal of this study is to define a wireless network architecture that can be deployed to enable contiguous coastal area network coverage for scientific, commercial, and homeland security (e.g. Coast Guard) applications within the USA Exclusive

Economic Zone (EEZ), in a manner that is flexible, manageable, and affordable. As described in Reference 1, we intend to determine the architectural requirements of such a system, delineate suitable technologies that will achieve such a vision, and provide a plan to demonstrate the concept.
DTIC
Broadband; Coasts; Communication Networks

20080041157 Physics and Electronics Lab. TNO, The Hague, Netherlands
The C2 Workstation and Data Replication over Disadvantaged Tactical Communication Links
Driesenaar, F N; Sep 2007; 15 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483369; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483369
No abstract available
Communication Networks; Computer Networks; Workstations

20080041231 Naval Postgraduate School, Monterey, CA USA
Data Centric Integration and Analysis of Information Technology Architectures
Giammarco, Kristin; Sep 2007; 179 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483402; No Copyright; Avail.: Defense Technical Information Center (DTIC)
The premise of this thesis is that integrated architectures have increased usefulness to the users of the systems they describe when they can be interactively and dynamically updated and used in conjunction with systems engineering analyses to enable systems optimization. In order to explore this premise, three research topics are presented. The first topic discusses needs and uses for integrated architectures indicated throughout Department of Defense (DoD) policies, directives, instructions, and guides. The second topic presents a systems engineering analysis process and discusses the relevancy of integrated architectures to these analyses. Building on the previous two topics, the third discusses federation, governance, and net-centric concepts that can be used to significantly improve DoD Enterprise Architecture development, integration, and analysis; with specific recommendations for the Army Architecture Integration Process. A key recommendation is the implementation of a collaborative environment for net-centric architecture integration and analysis to provide a rich and agile data foundation for systems engineering and System of Systems engineering analyses, which are required to optimize the DoD Enterprise Architecture as a whole. Other conclusions, recommendations, and areas for future work are also presented.
DTIC
Data Integration; Defense Program; Information Systems; Systems Engineering; Systems Integration

20080041244 Naval Postgraduate School, Monterey, CA USA
Solving the Maximum Clique Problem on a Class of Network Graphs, With Application to Social Networks
Pollatos, Spyridon; Jun 2008; 93 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483447; No Copyright; Avail.: Defense Technical Information Center (DTIC)
Social network analysis frequently uses the idea of a clique in a network to identify key subgroups of highly-connected members of the network. We formulate the maximum clique problem on undirected graphs and develop two algorithms to solve it: a pruning algorithm and an enumeration algorithm. The pruning algorithm successively improves an upper bound on the clique number of a graph, and the enumeration algorithm successively finds larger and larger cliques in the graph. Both terminate with a maximum clique in the graph, and, when run together, provide an interval of uncertainty on the size of a maximum clique in a graph that converges to zero. We apply our algorithms to real examples in the modeling of terrorist social networks, and determine that our algorithms are efficient and practical for problems of moderate size.
DTIC
Computer Networks; Graph Theory

20080041309 Naval Postgraduate School, Monterey, CA USA
Performance Management an Analysis of an IPv6 Sensor on the Move Using Commercial Network Management Software
Adame, Adrian S; Kong, Bruce; Jun 2008; 93 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483616; No Copyright; Avail.: Defense Technical Information Center (DTIC)
Internet Protocol version 4 (IPv4) has been the internet standard since specified nearly 27 years ago. Although IPv4 has served us well the ever-growing demand for additional IP addresses has lead to the introduction of a new IP version, IPv6.

Supported by Internet Engineering Task Force (IETF) for more than 10 years, IPv6 is recognized as a critical enabling technology throughout the federal government. IPv6 is also necessary in order to support the continuing growth of global communication requirements within Special Operations Forces (SOF); and ensure that the global Internet can continue to support a growing international user base and the increasing number of IP-enabled devices. Although numerous network management studies have been conducted few have concentrated on tactical or edge network management. Furthermore, few studies identify potential management tools supporting usability within the GIG. In coordinated effort with our primary sponsor, U.S. Special Operations Command (SOCOM), the Naval Postgraduate School (NPS) has developed the Tactical Network Topology (TNT) field experimentation program aimed at providing solutions for today s battle space. TNT facilitates the examination of network management through the functional area of performance management and will serve to identify management of IPv6 tactical networks with IPv4 components.
DTIC
Computer Systems Programs; Management Analysis; Reliability Analysis; Topology

20080041548 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Architecture Analysis of Evolving Complex Systems of Systems: Technical Presentation [and Executive Status Report]
Lindvall, Mikael; Godfrey, Sally; Ackermann, Chris; Ray, Arnab; Yonkwa, Lyly; Ganesan, Dharma; Stratton, William C.; Sibol, Deane E.; September 09, 2008; 43 pp.; In English; Software Assurance Symposium (SAS 2008), 9-11 Sep. 2008, Morgantown, WV, USA; Original contains color illustrations; Copyright; Avail.: CASI: A03, Hardcopy

Analyze, Visualize, and Evaluate structure and behavior using static and dynamic information, individual systems as well as systems of systems. Next steps: Refine software tool support; Apply to other systems; and Apply earlier in system life cycle. Derived from text
Complex Systems; Life (Durability); Architecture (Computers)

20080041667 Naval Postgraduate School, Monterey, CA USA
Teaching Security Engineering Principles
Irvine, Cynthia E; Levin, Timothy; Jul 2001; 16 pp.; In English
Report No.(s): AD-A483886; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483886

The design and construction of secure systems cannot be entirely captured in textbooks or class notes, but must be taught as an art which is learned through apprenticeship and practice. This paper describes a course in Secure Systems that uses the Flaw Hypothesis Methodology for penetration testing as a vehicle for motivating and teaching students fundamental principles of security engineering.
DTIC
Computer Information Security; Defects; Education; Hypotheses; Security; Systems Engineering

20080041715 Johns Hopkins Univ., Baltimore, MD USA
Exploring Robustness in Group Key Agreement
Amir, Yair; Kim, Yongdae; Nita-Rotaru, Cristina; Schultz, John; Stanton, Jonathan; Tsudik, Gene; Aug 2000; 27 pp.; In English
Contract(s)/Grant(s): F30602-00-2-0526
Report No.(s): AD-A484060; CNDS-2000-4; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484060

Secure group communication is crucial for building distributed applications that work in dynamic environments and communicate over unsecured networks (e.g. the Internet). Key agreement is a critical part of providing security services for group communication systems. Most of the current contributory key agreement protocols are not designed to tolerate failures and membership changes during execution. In particular, nested or cascaded group membership events (such as partitions) are not accommodated. In this paper we present the first robust contributory key agreement protocols resilient to any sequence of events while preserving the group communication membership and ordering guarantees.
DTIC
Protocol (Computers); Robustness (Mathematics)

20080041721 Argonne National Lab., IL USA

A Dynamic Object-Oriented Architecture Approach to Ecosystem Modeling and Simulation

Sydelko, Pamela J; Majerus, Kimberly A; Dolph, Jayne E; Taxon, Thomas N; Jan 2001; 13 pp.; In English

Report No.(s): AD-A484075; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA484075

Modeling and simulation in support of adaptive ecosystem management can be better accomplished through a dynamic, integrated, and flexible approach that incorporates scientific and technological components into a comprehensive ecosystem-modeling framework. The Integrated Dynamic Landscape Analysis and Modeling System (IDLAMS) integrates ecological models and decision support techniques, through a geographic information system (GIS)-based framework. The Strategic Environmental Research and Development Program (SERDP) sponsored the development of IDLAMS. Initially built upon a GIS framework, IDLAMS is migrating to an object-oriented (OO) architectural framework. An object-oriented architecture is more flexible and modular. It allows disparate applications and dynamic models to be integrated in a manner that minimizes (or eliminates) the need to rework or recreate the system as new models are added to the suite.

DTIC

Architecture (Computers); Ecosystems; Environment Models; Object-Oriented Programming; Simulation

20080041811 Pennsylvania Univ., Philadelphia, PA USA

A Formal Analysis of Some Properties of Kerberos 5 Using MSR

Butler, Frederick; Cervesato, Iliano; Jaggard, Aaron D; Scedrov, Andre; Jun 2002; 17 pp.; In English

Contract(s)/Grant(s): N00014-01-1-0431; N00014-01-1-0795

Report No.(s): AD-A484162; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We formalize aspects of the Kerberos 5 authentication protocol in the Multi-Set Rewriting formalism (MSR) on two levels of detail. The more detailed formalization reflects the intricate structure of the Kerberos 5 specification, taking into account several protocol features which have not been previously considered. In the abstract formalization, we prove an authentication property about Kerberos 5. We discovered three anomalies, one of which occurs on both levels of detail, while the other two rely on the richer structure of the detailed formalization. We also discuss how the addition of checksums (some of which are in the protocol specification and some of which are not) may eliminate some of these anomalies.

DTIC

Computer Information Security; Protocol (Computers)

20080041814 Naval Postgraduate School, Monterey, CA USA

Secure Flow Typing

Volpano, Dennis; Irvine, Cynthia; Jan 1997; 9 pp.; In English

Contract(s)/Grant(s): CCR-9612345

Report No.(s): AD-A484169; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Some of the most promising work in the area of enforcing secure information flow in programs is based on static analyses of source code. However, as yet, these efforts have not had much impact in practice. We present a new approach to analyzing programs statically for secrecy and integrity flow violations. The analysis is characterized as a form of type inference in a secure flow type system. The type system provides a uniform framework for traditional type checking of programs and information flow control. Type-correct programs have principal types that characterize how they can be called securely. Applications of the type system include flow analysis of legacy code as well as code written in newly-emerging Web languages like Java(tm).

DTIC

Computer Programming; Java (Programming Language); Security

20080041830 Naval Postgraduate School, Monterey, CA USA

The First ACM Workshop on Education in Computer Security

Irvine, Cynthia E; Jan 1997; 4 pp.; In English

Report No.(s): AD-A484200; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A successful first ACM Workshop on Education in Computer Security (WECS) was held in Monterey, CA on January 29-31 of 1997. The workshop was sponsored by ACM SIGSAC, the National Security Agency, the Defense Information Systems Agency, and the Naval Postgraduate School. Proceedings from the workshop are in preparation and should be available later in 1997. The workshop was international. For many, it was the first time we had met in person. Attendees came

from the academe, government and industry. Although educators comprised the majority, participation by potential employers of INFOSEC professionals helped to focus pedagogical objectives. The confluence of perspectives resulted in interesting discussions.
DTIC
Computer Information Security; Education

20080041836 Naval Postgraduate School, Monterey, CA USA
Overview of a High Assurance Architecture for Distributed Multilevel Security
Irvine, Cynthia E; Levin, Timothy E; Nguyen, Thuy D; Shifflett, David; Khosalim, Jean; Clark, Paul C; Wong, Albert; Afinidad, Francis; Bibighaus, David; Sears, Joseph; Jun 2004; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484215; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A high assurance architecture is described for the protection of distributed multilevel secure computing environments from malicious code and other attacks. Component security services and mechanisms extend and inter-operate with commodity PCs, commodity client software, applications, trusted components, and legacy single level networks, providing new capabilities for composing secure, distributed multilevel security. This architecture results from the realization that unless a secure system offers users comfortable and familiar interfaces for handling routine information, it will fail due to lack of user acceptability.
DTIC
Security

20080041856 Naval Postgraduate School, Monterey, CA USA
Resource Aggregation in Smart Sensor Systems
Singh, Gurminder; Kolsch, Mathias; Oct 2006; 4 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484258; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The authors describe a network of diverse sensors and methods for capability discovery and resource aggregation. Camera nodes utilize the distributed sensors for selective image acquisition and processing. Compared to standalone cameras, these networked sensors consume less power and can be adjusted to heterogeneous and situation-specific resolutions by spreading them thinner or denser. Most importantly, however, diverse sensors can exploit a wider range of the electromagnetic spectrum. In field tests, the system behaved well above the authors' expectations both in terms of detecting all events of interest as well as capturing images of interest. The authors have developed a sensor network for remote area surveillance of both vehicles and people. This sensor network uses a combination of several different types of sensors and networking technologies, including PIR (passive infrared), magnetometers and imaging devices as sensors, and satellite phones for communication. The system employs Crossbow's MSP-SYS410CA platform for implementing distributed object detection and motion estimation, and the TinyOS operating system for the sensor nodes. Sensor data is collected at an aggregator node which is equipped with a digital photo camera, a satellite phone connection, and a WiFi connection. Upon detecting an interesting object/event, the network triggers the camera to capture a number of photos which are uploaded via satellite phone to a remote control center. They are extending and improving their system in a number of ways. One extension links the ground-based sensor surveillance system with various Unmanned Aerial Vehicles (UAVs). These UAVs are equipped with video cameras and transmit live video to a ground station. They also are implementing video processing methods on each network's computational unit in the style of smart cameras.
DTIC
Digital Cameras; Surveillance

20080041865 Naval Postgraduate School, Monterey, CA USA
A Linux Implementation of Temporal Access Controls
Chiang, Ken; Nguyen, Thuy D; Irvine, Cynthia E; Jun 2007; 9 pp.; In English
Report No.(s): AD-A484279; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Control of access to information based upon temporal attributes can add another dimension to access control. To demonstrate the feasibility of operating system-level support for temporal access controls, the Time Interval File Protection System (TIFPS), a prototype of the Time Interval Access Control (TIAC) model, has been implemented by modifying Linux extended attributes to include temporal metadata associated both with files and users. The Linux Security Module was used to provide hooks for temporal access control logic. In addition, a set of utilities was modified to be TIFPS-aware. These tools permit users to view and manage the temporal attributes associated with their files and directories. Functional, performance,

and concurrency testing were conducted. The ability of TIFPS to grant or revoke access in the future, as well to limit access to specific time intervals enhances traditional information control and sharing.
DTIC
Access Control; Access Time; Numerical Control; Security; Unix (Operating System)

20080041920 Cornell Univ., Ithaca, NY USA
Source Reconstruction via Mobile Agents in Sensor Networks: Throughput-Distortion Characteristics
Dong, Min; Tong, Lang; Sadler, Brian M; Oct 2003; 6 pp.; In English
Contract(s)/Grant(s): DAAB19-00-1-0507; N00014-00-1-0564
Report No.(s): AD-A484471; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We consider the problem of reconstructing a signal field measured by a large scale sensor network with mobile agents. Sensors transmit packets containing measurement data to mobile agents using either random or deterministic medium access control 'MAC' schemes, and the signal field is reconstructed by mobile agents that minimize the mean square error of the reconstruction. For the one-dimensional Gauss-Markov field, we investigate the relation between the system throughput and reconstruction distortion, for different types of MAC schemes. We show that at low throughput level, increasing system throughput decreases the reconstruction distortion considerably. But the improvement is much less when the throughput is relatively high. We also show that the choice of MAC schemes can affect the reconstruction performance significantly, especially when the measurement noise is low.
DTIC
Communication Networks; Computer Networks; Detectors; Distortion; Mobile Communication Systems

20080041923 Naval Postgraduate School, Monterey, CA USA
Supporting the Education of Information Assurance with a Laboratory Environment
Clark, Paul C; May 2001; 13 pp.; In English
Report No.(s): AD-A484475; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Too many students are graduating from colleges and universities without taking a single course in information assurance. The need for students to receive more and better education in information assurance is undisputed. For those educational institutions already requiring and/or teaching such courses, the educational experience can be greatly enhanced with a supportive laboratory environment where carefully chosen hands-on tutorials or exercises can be assigned to support the material being presented in the classroom. This paper describes the experiences of supporting information assurance exercises and tutorials at the Naval Postgraduate School. Recommendations are provided so that others may learn from the experience.
DTIC
Education; Security; Students

20080041925 Naval Postgraduate School, Monterey, CA USA
Naval Postgraduate School Center for INFOSEC Studies and Research: Teaching the Science of Computer Security
Irvine, Cynthia E; Jan 1997; 6 pp.; In English
Report No.(s): AD-A484478; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Naval Postgraduate School Center for Information Systems Security (INFOSEC) Studies and Research (NPS CISR) is developing a comprehensive program in INFOSEC education and research that can become a resource for DoN/DoD and U.S Government in terms of educational materials and research. A security track within the Computer Science curriculum has been established. Its philosophical core is the abstract notion of conceptually complete security mechanism, the Reference Monitor Concept. Building upon a core curriculum of computer science and engineering, the security courses convey vital concepts and techniques associated with INFOSEC today.
DTIC
Computer Information Security; Education; Information Systems; Schools; Security

20080042049 Texas A&M Univ., College Station, TX USA
Design of Efficient Synchronization Protocols for Wireless Airborne Networks
Serpedin, Erchin; Jul 2008; 51 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-07-1-0061; Proj-CITE
Report No.(s): AD-A484206; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The goal of this project was to develop efficient clock synchronization schemes to ensure robust operation of wireless

airborne networks in the absence of GPS (Global Positioning Systems), and in the presence of mobility, time-varying channel conditions, and ad-hoc network topologies. The major contributions of this project include the development of analytical performance tools to assess the performance of clock synchronization protocols and development of novel clock synchronization protocols to achieve the ultimate performance limits predicted by the analytical performance benchmarks. The work conducted in this project lead also to the development of two novel time synchronization protocols: Adaptive Synchronization Protocol and Pairwise Broadcast Synchronization (PBS) Protocol, respectively, which were shown to exhibit a number of desirable features (such as scalability, adaptivity, energy-efficient and distributed capabilities) for clock synchronization in wireless airborne networks and wireless sensor networks.
DTIC
Clocks; Communication Networks; Protocol (Computers); Synchronism

20080042129 Rhode Island Univ., Narragansett, RI USA
Development of an Integrated Regional, National and International Data System for Oceanography
Cornillon, Peter; Butman, Brad; Chinman, Richard; Collins, Don; Cummings, James; Flierl, Glenn; Fulker, Dave; Gallagher, James; Habermann, Ted; Hamilton, Peter; Jan 2003; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484198; No Copyright; Avail.: Defense Technical Information Center (DTIC)

As part of a phased approach toward an Integrated Ocean Observing and Prediction System, NOPP in 1999 selected a few preliminary steps for development. One of these steps was to plan and implement 'a community-based 'system' to broaden and improve access to ocean data'. The project described herein was proposed in response to the 2000 NOPP BAA and has as its long-term goal the development of such a system; i.e., the implementation of a network based system that would provide for the discovery of and seamless access to oceanographic data. The ultimate goal is a system that will provide immediate access to a vast array of real-time and historical oceanographic archives by all segments of the oceanographic community from the one-time user to the modelers and managers requiring regular and automatic ingestion of the highest quality data and data products. The objectives of this project are: 1. The development of a data access protocol capable of handling the exchange of all oceanographic data types biological, physical, chemical and geological as well as products derived from these data. This objective is based on the assumption that at the core of any network based distributed data system is middleware that allows for the seamless exchange of data between system elements. 2. The development of a representative set of data servers and data clients based on the protocol. These system elements will be used to evaluate the protocol as well as to provide a catalyst for the use of the system. 3. The linking of in excess of two terabytes of oceanographic data held in over 250 databases at approximately 40 sites via this system to provide a core set of data in the system to stimulate its use. 4. The establishment of a diverse group from the ocean data user community committed to the success of the system. 5. The building of the basic infrastructure required to couple data providers and users in the science community with data providers and users in the GIS community.
DTIC
Data Systems; Information Systems; Oceanographic Parameters; Oceanography

20080042170 Naval Postgraduate School, Monterey, CA USA
Challenges in Computer Security Education
Irvine, Cynthia E; Oct 1997; 3 pp.; In English
Report No.(s): AD-A484034; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484034

A friend of mine was part of a team assigned to build a networking product. Just as they were finishing up someone asked, 'What about security?' At that point, it was a little late to do much about the system's security architecture, so they ultimately rolled out the product with a sprinkling of security sugar. The customer, who didn't even know how to ask for security, was pleased and probably will be until disaster strikes. This is just one example of the insufficient attention paid to security engineering and the secure use of computers. Companies are often unaware of even the most rudimentary procedures for securing their systems, while in the computer industry careful security engineering is left in the dust of rapid release cycles. Although awareness is increasing about the need for better computer security, to actually move in that direction we need people who know what they want, people who can build secure systems, and people who can manage those systems so they stay secure. For three days last January, an international group met to discuss some of these issues at the First ACM Workshop on Education in Computer Security, held in Monterey, California. Representatives from 20 universities and a sprinkling of information systems security employers from industry and government were invited to attend based on position papers they had written. The group's task was to discuss ways to address the impending crisis in information security education. Among

the questions addressed were articulating the diversity of information security education requirements for different careers and the need for training and retaining security experts in education.
DTIC
Computer Information Security; Education; Instructors; Security

20080042183 Florida Inst. for Human and Machine Cognition, Inc., Pensacola, FL USA
Agile Computing for Air Force Information Management Infrastructures
Suri, Niranjan; Jun 2008; 26 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-06-2-0064; Proj-ICED
Report No.(s): AD-A483786; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483786

The objective of this effort was to leverage from and extend the agile computing approach and metaphor to improve Air Force Information Management infrastructures for dynamic and tactical environments. Four specific areas of research were: 1) Dynamic service instantiation, relocation and optimization, 2) Dynamic service discovery, 3) Proactive service link maintenance, and 4) Efficient data dissemination and predicate processing in dynamic networks.
DTIC
Communication Networks; Information Management; Management Systems; Wireless Communication

20080042400 NASA Johnson Space Center, Houston, TX, USA
A Holistic Approach to Systems Development
Wong, Douglas T.; October 20, 2008; 30 pp.; In English; 11th Annual Systems Engineering conference, 20-23 Oct. 2008, San Diego, CA, USA; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080042400

Introduces a Holistic and Iterative Design Process. Continuous process but can be loosely divided into four stages. More effort spent early on in the design. Human-centered and Multidisciplinary. Emphasis on Life-Cycle Cost. Extensive use of modeling, simulation, mockups, human subjects, and proven technologies. Human-centered design doesn t mean the human factors discipline is the most important Disciplines should be involved in the design: Subsystem vendors, configuration management, operations research, manufacturing engineering, simulation/modeling, cost engineering, hardware engineering, software engineering, test and evaluation, human factors, electromagnetic compatibility, integrated logistics support, reliability/maintainability/availability, safety engineering, test equipment, training systems, design-to-cost, life cycle cost, application engineering etc. 9
Derived from text
Life Cycle Costs; Systems Engineering; System Effectiveness; Human Factors Engineering; Configuration Management; Software Engineering; Computer Programs; Education

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CYBERNETICS, ARTIFICIAL INTELLIGENCE AND ROBOTICS

Includes feedback and control theory, information theory, machine learning, and expert systems. For related information see also *54 Man/System Technology and Life Support*.

20080041097 Signal Innovations Group, Inc., Durham, NC USA
Multi-Sensor Information Integration and Automatic Understanding
Welborn, Matthew; May 27, 2008; 7 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-05-C-0294
Report No.(s): AD-A483215; SIG.ONR.OPT3.Q2; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483215

During this reporting period, we have completed the integration of our robust detection & tracking engine with the asymmetric threat behavior analysis capabilities that we have developed under this C2CS effort. We have implemented a software application that can process real-time or archived color video data to extract objects tracks and features and to identify in real-time any objects that exhibit anomalous behavior characteristics. The SIG team attended the PI Gathering at ONR in May 2008 and presented our current results as well as providing a demonstration of the integrated software behavior detection application. In recent months, we have also made significant progress in extending our initial behavior analysis work

to include long-term track information in addition to the instantaneous object positions and trajectories used in our initial work.
DTIC
Cameras; Cues; Multisensor Applications

20080041171 Naval Research Lab., Washington, DC USA
An Experimental Benchmark for Improved Simulation of Absolute Soft X-Ray Emission from Polystyrene Targets Irradiated With the Nike Laser
Weaver, J L; Busquet, M; Colombant, D G; Mostovych, A N; Feldman, U; Klapisch, M; Seely, J F; Brown, C; Holland, G; Feb 3, 2005; 17 pp.; In English
Report No.(s): AD-A483432; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483432

Absolutely calibrated, time-resolved spectral intensity measurements of soft x-ray emission from laser-irradiated polystyrene targets are compared to radiation-hydrodynamic simulations that include our new postprocessor, Virtual Spectro. This new capability allows a unified, detailed treatment of atomic physics and radiative transfer in non-LTE conditions for simple spectra from low-Z materials as well as complex spectra from high-Z materials. The excellent agreement (within a factor approximately 1.5) demonstrates the powerful predictive capability of the codes for the complex conditions in the ablating plasma. The absolute spectral intensity measurements were made in the XUV region (hv approximately 0.1-1.0 keV) with transmission grating spectrometers with good time resolution (t approximately 0.3 ns) and moderate spectral resolution (E/delta E approximately 10). Comparison to data with high spectral resolution (E/delta E approximately 1000) emphasizes the importance of including radiation coupling in the quantitative simulation of emission spectra.
DTIC
Emission; Irradiation; Lasers; Line Spectra; Polystyrene; Simulation; Targets; X Rays

20080041265 Space and Naval Warfare Systems Center, San Diego, CA USA
Intelligent Behaviors for a Convoy of Indoor Mobile Robots Operating in Unknown Environments
Farrington, Nathan M; Nguyen, Hoa G; Pezeshkian, Narek; Oct 2004; 10 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483501; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Intelligent behaviors allow a convoy of small indoor robots to perform high-level mission tasking. These behaviors include various implementations of map building, localization, obstacle avoidance, object recognition, and navigation. Several behaviors have been developed by SSC San Diego, with integration of other behaviors developed by open-source projects and a technology transfer effort funded by DARPA. The test system, developed by SSC San Diego, consists of ROBART III (a prototype security robot), serving as the master platform, and a convoy of four ActivMedia (Trademark) Pioneer 2-DX robots. Each robot, including ROBART III, is equipped with a SICK (Trademark) LMS 200 laser rangefinder. Using integrated wireless network repeaters, the Pioneer 2-DX robots maintain an ad hoc communication link between the operator and ROBART III. The Pioneer 2-DX robots can also act as rear guards to detect intruders in areas that ROBART III has previously explored. These intelligent behaviors allow a single operator to command the entire convoy of robots during a mission in an unknown environment.
DTIC
Artificial Intelligence; Navigation; Robots; Wireless Communication

20080041308 Naval Command, Control and Ocean Surveillance Center, San Diego, CA USA
Learning in Robot Vision Directed Reaching: A Comparison of Methods
Blackburn, Michael R; Nguyen, Hoa G; Nov 1994; 9 pp.; In English
Contract(s)/Grant(s): MIPR-N0001493WX2D002
Report No.(s): AD-A483612; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Four neural network algorithms were examined for their ability to adaptively associate stereo camera coordinates with joint positions of a three degree of freedom manipulator arm in a 3D reaching task. Given reasonable numbers of training exemplars for an implementation in real hardware, all networks trained to significant errors. Two secondary error correction procedures were then tested. Both further reduced errors, but one method that depended on continuous visual and proprioceptive feedback to train a small set of associative weights that correlated joint and camera velocities was especially effective in eliminating errors. Stereo pan, tilt and vergence information was used to direct ballistic reaching, but relative depth

information, was used for the visual feedback of end-effector velocity in the second error correction method.
DTIC
Algorithms; Computer Vision; Coordination; Machine Learning; Neural Nets; Robotics; Robots

20080041310 Pennsylvania Univ., Philadelphia, PA USA
Modeling and Simulation of Agents in Resource Strategy Games
Silverman, Barry G; Bharathy, Gnana; Nye, Benjamin; Smith, Tony E; Jan 2008; 29 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-05-1-0268
Report No.(s): AD-A483617; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Military, diplomatic, and intelligence analysts are increasingly interested in having a valid system of models that span the social sciences and interoperate so that one can determine the effects that may arise from alternative courses of action in different lands. Part I of this article concentrated on internal validity of the components of such a synthetic framework. But how valid are such model collections once they are integrated together and used out-of-sample (see Section 1)? Section 2 compares these realistic, descriptive agents to normative rational actor theory and offers insights for conflict games. Sections 3 and 4 offer two real world cases (Iraq and SE Asia) where the agent models are subjected to validity tests and an EBO experiment is then run for each case. We conclude by arguing that substantial effort on game realism, best-of-breed social science models, and agent validation efforts is essential if analytic experiments are to effectively explore conflicts and alternative ways to influence outcomes. Such efforts are likely to improve behavioral game theory as well.
DTIC
Decision Support Systems; Foreign Policy; Games; Simulation

20080041638 ITT Corp., Clifton, NJ USA
Long-Term Clock Behavior of GPS IIR Satellites
Epstein, Marvin; Dass, Todd; Rajan, John; Gilmour, Paul; Nov 2007; 21 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483835; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483835

The ITT-developed GPS IIR satellite payloads have been on orbit since 1997, and have proven to be the best family of clocks in the GPS constellation. At this time, there is a substantial recorded history of clock behavior, including over 60 clock years of space operation. The age of the oldest clock is over 9 years. A review of the record shows a number of significant characteristics that were not apparent in shorter clock tests. Rubidium clocks, as opposed to cesium clocks, have significant long-term drift. The current literature describes an initial model of drift aging for rubidium atomic clocks followed by a long-term characteristic. A review of the IIR clocks shows what appears to be another significant break point in the long-term drift characteristics. The usual assumption is that the drift tends toward zero drift in the long term. The data indicate that the long-term drift will always remain negative and stay substantially away from zero. It is commonly known that some rubidium clocks generate frequency steps and the frequency steps tend to decrease in size and rate of occurrence over time. We have seen a number of cases of this behavior. Most frequency steps tend to be frequency steps that tend to persist in time, but we also have seen triangular frequency patterns where a sudden jump in frequency is followed by a rapid decay to the long-term drift pattern. Also, we have cases in which a frequency step pattern that has persisted for a significant time suddenly disappears. Although there are cases where the frequency step intensity initially grows after turn-on, the overall pattern is for the frequency step intensity to decay over the long term. Future observations of these clocks will allow us to determine if this decay in frequency step intensity is permanent.
DTIC
Artificial Satellites; Atomic Clocks; Clocks; Global Positioning System; Navigation Satellites

20080041710 RAND Corp., Santa Monica, CA USA
Forgetting in an Association Memory
Feigenbaum, Edward A; Simon, Herbert A; May 24, 1961; 14 pp.; In English
Report No.(s): AD-A484029; RAND-P-2311; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484029

A model of association memory, the EPAM (Elementary Perceiver and Memorizer) system is a learning system, a computer simulation of human verbal learning processes. No stored information in this memory is ever physically destroyed. Yet the behavior which we normally call forgetting occurs because of a loss of access (temporary or permanent) to information

stored in a growing net of associations. In this system, forgetting occurs as a direct consequence of normal learning processes (i.e., forgetting is the result of the interference of items later learned with items learned earlier) without the postulation of a separate mechanism. Two experiments with human verbal learning are discussed, and the interference phenomena are explained in terms of the EPAM model.
DTIC
Artificial Intelligence; Information Retrieval; Learning; Losses

20080041733 Defense Acquisition Univ., Fort Belvoir, VA USA
Artificial Intelligence for Constructing Accurate, Low-Cost Models and
Brown, David P; Jan 2005; 375 pp.; In English
Report No.(s): AD-A484107; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484107

Modeling and Simulation is an important tool in product development. Current practice is to use an equation-based approach. Equation-based models can require extensive time and money to construct high fidelity models that accurately represent the real world. The primary goal of this research is to explore alternate methods of creating accurate models and simulations that can be done rapidly and at much lower. The research compared engineering modeling applications for time of construction and the accuracy between equation-based models and three methods of Bayesian network construction: human judgment, formulae and computer-generated. The derivative method, a multivariate approach to discretion continuous data was proposed and compared to four current search and score methods. The comparison found little difference in performance between different methods of discretion; however, the derivative method was faster than any of the iterative search and score techniques. The research software also integrated a neural network into the Bayesian network construction.
DTIC
Artificial Intelligence; Low Cost; Models; Simulation

20080041809 Defense Acquisition Univ., Fort Belvoir, VA USA
Artificial Intelligence for Constructing Accurate, Low-Cost Models and Simulations
Brown, David P; Mohler, Richard A; Dec 2005; 14 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484157; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Modeling and Simulation is an important tool in the development of the highly effective weapons systems built by the USA and its allies. However, recent initiatives to reduce the cost of weapon systems through expanded use of modeling and simulation during the development process have not always lived up to expectations. Current practice in the construction of models and simulations primarily uses a manual implementation of equations to describe the entity being modeled. After verifying correct operation, these models are then validated by comparing them to data from real world tests to insure accuracy. These equation-based models require extensive time and money in order to construct high fidelity models that accurately represent the real world. Our research explores an alternate method of creating accurate models and simulations that can be done rapidly and at much lower cost. This approach uses hybrid artificial intelligence to create the models and simulations directly from validation data sets. Test results using this method of modeling militarily representative systems such as wing lift, radar, and Forward Looking Infrared 'FLIR' demonstrated a reduction of over 90% in human labor required to create the models while simultaneously achieving approximately 70% better accuracy as compared to equation-based models prior to validation. Because this method builds the models from a data set, the method can be used to construct models of activities such as human decision-making that cannot be described using an equation-based approach. Additionally, the research demonstrated that models created using this method could be fully integrated with existing equation-based models.
DTIC
Artificial Intelligence; Low Cost; Models; Simulation

20080042025 George Mason Univ., Fairfax, VA USA
Intelligent Assistants for Distributed Knowledge Acquisition, Integration, Validation, and Maintenance
Tecuci, Gheorghe; Boicu, Mihai; May 2008; 39 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-04-1-0257; Proj-SMET
Report No.(s): AD-A483150; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483150

This research has developed an integrated set of tools, called Disciple 2008 learning agent shell, for continuous acquisition of knowledge directly from subject matter experts, and for the integration, validation, and maintenance of the

acquired knowledge. During mixed-initiative problem solving sessions, Intelligent Disciple assistants supporting individual subject matter experts acquire their problem solving expertise by employing an integrated set of learning, maintenance and validation methods. The acquired knowledge is shared by the subject matter experts and their Disciple assistants in a distributed and hierarchical repository. The Disciple 2008 learning agent shell was used to develop and transition Disciple-COG, a problem solving and learning agent for center of gravity analysis. Disciple-COG is regularly used in courses at the US Army War College and was also successfully used at the Air War College. The transition of Disciple-COG is supported by lecture notes and the text book Agent-assisted Center of Gravity Analysis that provides both a detailed description of the developed center of gravity analysis approach, and step by step instructions for using Disciple-COG.
DTIC
Artificial Intelligence; Decision Support Systems; Maintenance

20080042123 Naval Postgraduate School, Monterey, CA USA
Application of Formation Control for Multi-Vehicle Robotic Minesweeping
Healey, Anthony J; Dec 2001; 7 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484205; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In an effort to find low cost solutions to Naval minesweeping, a fleet of robot minesweepers equipped with detection sensors and acoustic/magnetic devices is proposed. To ensure maximum sweeping all vehicle movements are coordinated through a supervisor vehicle that determines if vehicles are lost to mine detonation, and re-tasks, as needed, the remaining vehicles to follow tracks left by lost vehicles. A computer program has been developed to evaluate control logic linking supervisor and worker vehicles. The algorithms for track control and vehicle ID reassignment are given and example results shown.
DTIC
Computer Programs; Robotics; Robots

20080042171 Naval Postgraduate School, Monterey, CA USA
NPS ARIES Forward Look Sonar Integration
Healey, A J; Horner, D P; Jan 2004; 6 pp.; In English
Contract(s)/Grant(s): N00014-04-WR-20093
Report No.(s): AD-A484036; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484036

This work integrated an experimental Blazed Array Forward Looking Sonar (FLS) developed by the University of Washington, Applied Physics Laboratories into the ARIES autonomous underwater vehicle (AUV). Experiments were conducted and data were gathered using this sonar in a variety of environments. The images generated were analyzed to provide information for use in the further development of forward look obstacle detection and avoidance technologies. The year-end goal of the project was to collect FLS data and make it available to researchers interested in developing obstacle avoidance behaviors for AUVs. To develop robust obstacle avoidance algorithms for underwater vehicles it is necessary to understand how the sonar performs on an underway underwater vehicle and to have a sample data set from an underway vehicle for the developmental modeling and simulation of vehicle control and image processing. The approach was to bring together a team from the University of Washington and the Naval Postgraduate School to integrate a low power, small forward looking sonar into the ARIES AUV. They decided on quarterly collections which would culminate in the permanent installation of the Blazed Array onto the ARIES AUV so that the vehicle could be used continuously for data collection, the evaluation of obstacle avoidance behaviors, and eventually, concurrent mapping and localization.
DTIC
Autonomous Navigation; Autonomy; Collision Avoidance; Image Processing; Sonar; Sound Detecting and Ranging; Underwater Vehicles

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NUMERICAL ANALYSIS

Includes iteration, differential and difference equations, and numerical approximation.

20080041062 Naval Postgraduate School, Monterey, CA USA
Mountain-Slope Afforestation for Valley Urban Air-Quality Improvement
Chu, Peter C; Chen, Yuchun; Lu, Shihua; Jan 2004; 8 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483128; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483128

Lanzhou is one of the major cities in northwest China and the capital of Gansu Province and located at a narrow (2-8 km width), long (40-km), NW-SE oriented valley basin (elevation: 1,500- 1,600-m) with the Tibetan plateau in the west, Baita mountain (above 1,700-m elevation) in the north, and the Gaolan mountain in the south. Due to topographic and meteorological characteristics, Lanzhou is one of the most polluted cities in China. Meteorological conditions (low winds, stable stratification especially inversion), pollutant sources and sinks affect the air quality. Afforestation changes the mountain-valley local circulation system, destabilizes the atmosphere, and weakens the inversion. Besides, it may absorb some pollutants (sink). Lanzhou local government carried out afforestation and pollutant-source reduction (closing several heavy industrial factories) to improve the air-quality for the past two decades. Numerical model (RAMS-HYPACT) simulates the effect of afforestation on the air pollution (TSP, SO2, NOx ...) control.
DTIC
Air Pollution; Air Quality; Industrial Plants; Mathematical Models; Mountains; Slopes; Valleys

20080041088 Army Engineer Research and Development Center, Vicksburg, MS USA
Physical Model of Current-Induced Scour at Ventura Harbor
Hughes, Steven A; Schwichtenberg, Bradd R; Jan 1999; 20 pp.; In English
Report No.(s): AD-A483196; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483196

This paper describes a 1:25-scale movable-bed physical model study of scour resulting from longshore current passing through a narrow gap on the leeside of the detached breakwater at Ventura Harbor, California, USA. The physical model was calibrated by adjusting the total flow discharge to achieve equilibrium scour development that matched the scour hole measured at Ventura Harbor. The calibrated model was then used to predict future scour potential and to optimize the design for remedial toe protection intended to prevent leeside armor layer damage on the detached breakwater. In addition, the model study identified and eliminated several construction problems that could have caused significant unforeseen expenditures.
DTIC
Harbors; Jet Flow; Marine Technology; Models; Offshore Platforms

20080041145 Florida International Univ., Miami, FL USA
IPDO-2007: Inverse Problems, Design and Optimization Symposium
Dulikravich, George S; Aug 2007; 20 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-07-1-0230
Report No.(s): AD-A483332; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483332

IPDO-2007 Symposium's main objectives were to bring the three communities of researchers (inverse problems experts, design theory experts, and optimization experts) together and provide a common forum for presenting different applications, problems, and solution strategy concepts. These three areas of research covered by the IPDO Symposium have a number of things in common. For example, many methodologies for solving inverse problems employ optimization algorithms. However, there are no optimization algorithms that employ methods of inverse design that could substantially reduce the number of time-consuming analysis required by the typical evolutionary optimization algorithms.
DTIC
Conferences; Design Analysis; Design Optimization; Optimization

20080041153 Louisville Univ., KY USA

Dual Channel Transmission for Coexistence of Wireless Networks

Liu, Xiangqian; Aug 2007; 47 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-06-1-0415

Report No.(s): AD-A483355; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483355

With the upcoming pervasive deployment of wireless networks and devices on the unlicensed band, co-channel interference caused by frequency collisions among coexisting networks have become one of the major performance limiting challenges. In recent years the coexistence issue has gained increasing attention. However, many collision avoidance schemes are not applicable to multiple frequency hopped (FH) networks, mainly due to that the frequency channels of FH signals are constantly changing and the hop sequence of one network is unknown to another. In this project, we develop a dual channel transmission technique for co-channel interference mitigation and robust coexistence of multiple wireless networks. This report describes the system modeling, design, theoretic analysis, simulation and testbed implementation involved in the aforementioned framework.

DTIC

Frequency Hopping; Frequency Shift; Reception Diversity

20080041307 Naval Postgraduate School, Monterey, CA USA

Contact Analysis of Nominally Flat Surfaces

Shellock, Matthew R; Jun 2008; 69 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483610; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A proper understanding of the mechanism of contact between two or more nominally flat surfaces is crucial in the design process of many devices. This thesis, using analytical and computational methods, models the former through the use of fractal characteristics at the contact interface. A parametric analysis of the fractal surface was completed in order to properly understand fractal geometry and its effect on surface properties. The fractal surface was simplified so that Hertz theory could be used to model surface deformation and resulting contact stresses. The data gathered from the model was then input into an existing electromagnetic rail gun program to study the contact surface effect on exit velocity, temperature, electrical conductivity, and contact area ratio. Finally, a study of the fractal parameter effects on the electromagnetic rail gun was completed.

DTIC

Flat Surfaces; Fractals

20080041362 Naval Postgraduate School, Monterey, CA USA

Pascal Polynomials Over GF(2)

Fernandez, Carlos K; Jun 2008; 71 pp.; In English

Report No.(s): AD-A483773; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Discrete Logarithm Problem (DLP) is a fundamental cryptographic primitive. The DLP is defined for any cyclic group, specifically finite fields, whether the integers modulo a prime p or a polynomial field of characteristic p modulo some irreducible polynomial f(x). For polynomial fields over a finite field, also known as Galois fields, the DLP can be viewed as finding a solution to the equation 1 + x(i) = x(j) for arbitrary values of i (modulo some primitive polynomial). Solutions are (relatively) easy to find for trinomials and these would be the easiest polynomials to implement in hardware. However, primitive trinomials do not exist for all degrees. Primitive polynomials are irreducible polynomials with an associated primitive root alpha that is a generator of the multiplicative group. Thus the generator alpha generates all nonzero 2(n) - 1 elements of a Galois field whose base field is the integers modulo two. Primitive polynomials over the field of two elements, or GF(2), have important applications in cryptology and coding theory. This thesis investigates properties of polynomials with more than three terms where all but one term is a row of Pascal's triangle modulo two. In other words we define a certain class of polynomials by f(x) + x(n) + p(x) is a row of Pascal's triangle modulo two. This thesis shows that some of these polynomials, which are not trinomials, also have 'easy' solutions. We observe that for a polynomial to have an associated primitive element, there are definite restrictions on the degree of the polynomial using particular rows of Pascal's triangle.

DTIC

Pascal (Programming Language); Polynomials

20080041600 NASA Langley Research Center, Hampton, VA, USA

An Initial Investigation of the Effects of Turbulence Models on the Convergence of the RK/Implicit Scheme

Swanson, R. C.; Rossow, C.-C.; August 2008; 42 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): WBS 561581.02.08.07.20.02

Report No.(s): NASA/TM-2008-215342; L-19509; Copyright; Avail.: CASI: A03, Hardcopy

A three-stage Runge-Kutta (RK) scheme with multigrid and an implicit preconditioner has been shown to be an effective solver for the fluid dynamic equations. This scheme has been applied to both the compressible and essentially incompressible Reynolds-averaged Navier-Stokes (RANS) equations using the algebraic turbulence model of Baldwin and Lomax (BL). In this paper we focus on the convergence of the RK/implicit scheme when the effects of turbulence are represented by either the Spalart-Allmaras model or the Wilcox k-! model, which are frequently used models in practical fluid dynamic applications. Convergence behavior of the scheme with these turbulence models and the BL model are directly compared. For this initial investigation we solve the flow equations and the partial differential equations of the turbulence models indirectly coupled. With this approach we examine the convergence behavior of each system. Both point and line symmetric Gauss-Seidel are considered for approximating the inverse of the implicit operator of the flow solver. To solve the turbulence equations we use a diagonally dominant alternating direction implicit (DDADI) scheme. Computational results are presented for three airfoil flow cases and comparisons are made with experimental data. We demonstrate that the two-dimensional RANS equations and transport-type equations for turbulence modeling can be efficiently solved with an indirectly coupled algorithm that uses the RK/implicit scheme for the flow equations.

Author

Turbulence Effects; Runge-Kutta Method; Computational Fluid Dynamics; Baldwin-Lomax Turbulence Model; Incompressible Flow; Navier-Stokes Equation; Reynolds Averaging

20080041639 Deutsches Zentrum fuer Luft- und Raumfahrt e.V., Oberpfaffenhofen, Germany

Ensemble Time in GNSS - Performance Requirements and Algorithm Tests

Suess, Mattgias; Moudrak, Alexandre; Frolova, E; Nov 2007; 13 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483836; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483836

Any Global Navigation Satellite System (GNSS) relies on a highly stable and reliable System Time that has to meet high-performance requirements to enable GNSS services suitable for navigation and timing communities. The challenge is to guarantee this high performance continuously. The Kalman filter algorithm implemented in GPS, called the GPS Composite Clock, is a mature method to generate such a highly robust System Time. The algorithm estimates the time offsets of every individual clock to the so-called implicit mean, which is a common component in all clock estimates. The common component offers the functionality of System Time and is understandable as a weighted average out of all ensemble clock readings. GPS Composite Clock performance is analyzed by simulations of a 'light' GNSS configuration with 10 rubidium satellite clocks, including deterministic drift, six ground cesium clocks, and two ground active hydrogen masers. Besides evaluating the stability of an error-free clock constellation to define the regular performances, the behavior of the algorithm is investigated considering different operational scenarios: exclusion of clocks from the GNSS ensemble and occurrence of clock feared events (frequency steps in rubidium satellite clocks and ground H-masers).

DTIC

Algorithms; Artificial Satellites; Global Positioning System; Navigation Satellites; Performance Tests

20080041659 Brown Univ., Providence, RI USA

High Order Accuracy Methods for Supersonic Reactive Flows

Gottlieb, David; Don, Wai-Sun; Jun 25, 2008; 79 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-0123

Report No.(s): AD-A483872; TR-4; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483872

A multi-domain spectral method with stable and conservative penalty interface conditions for the numerical simulation of supersonic reactive recessed cavity flows with inhomogeneous grid is developed. The high order hybrid Spectral-WENO finite difference method under multi-domain framework is also introduced for the numerical solution of two dimensional nonlinear hyperbolic conservation laws in a Cartesian physical domain. A different approach in attempting to get more meaningful resultss is to model statistically those scales that can not be resolved. Methods for modeling those scales are being

developed and applied. Numerical issues, such as boundary conditions, are being addressed and a new boundary procedure is being presented.
DTIC
Numerical Analysis; Reactivity; Supersonic Flow

20080041663 RAND Corp., Santa Monica, CA USA
A Look at Various Estimators in Logistic Models in the Presence of Missing Values
Chow, Winston K; Oct 1979; 33 pp.; In English
Contract(s)/Grant(s): 016B-7901-P2021
Report No.(s): AD-A483877; RAND/N-1324-HEW; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483877

Two commonly used procedures for estimating the parameters of a logistic regression function are the maximum likelihood estimators and the discriminant function estimators. Comparisons of these procedures for fitting logistic regression models based on the experience of many researchers can be found in the literature. The comparisons become more complicated when one or more values of the independent variables of certain observations are missing at random. When data are missing, researchers may not be willing to base their estimates only on the subset of complete cases, particularly if the size of this subset is relatively small.
DTIC
Maximum Likelihood Estimates; Regression Analysis

20080041664 Michigan Univ., Ann Arbor, MI USA
Discontinuous Galerkin for Diffusion
van Leer, Bram; May 21, 2008; 10 pp.; In English
Contract(s)/Grant(s): FA9550-06-1-0425
Report No.(s): AD-A483878; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483878

The funded period of this project ran out on 30 November 2007; a no-cost extension of 3 months was requested by the PI for medical reasons, and was granted. In the second year the effort addressed the following issues: (1) making the Recovery-based Discontinuous Galerkin method (RDG) suitable for multidimensional applications, (2) increasing its efficiency by constructing the recovery basis once as pre-processing step for an entire calculation, (3) the combination of RDG with upwind DG for advection (URDG), (4) writing the general 1-D form of RDG as a penalty method, (5) dissemination via conferences and publications, and (6) technology transfer. Over the total grant period the RDG method developed from a promising one-dimensional Discontinuous Galerkin discretization technique for diffusion terms with superior accuracy and good stability to an efficient multidimensional methodology with a solid theoretical underpinning and ready for transfer to Air Force/industrial use.
DTIC
Diffusion; Discontinuity; Galerkin Method

20080041678 Level Set Systems, Inc., Pacific Palisades, CA USA
A Level Set Based Geometrical Eulerian Approach to Computing High Frequency Radar Cross Sections and Multiphase Semiclassical Limits of the Schrodinger Equation
Osher, Stanley; Jun 30, 2008; 5 pp.; In English
Contract(s)/Grant(s): FA9550-04-1-0143
Report No.(s): AD-A483927; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483927

Wave propagation in the high frequency regime can be simplified using the geometrical optics approximation. We obtained an eikonal approximation for the phase and transport equations for the amplitude. The general strategy used to find the phase is to solve for its level sets, called wave fronts. This same strategy works to compute semiclassical solutions of Schrodinger's equation, which is the main topic we studied here. Traditional obstacles faced in numerical approaches are in dealing with multivaluedness and resolution of wave fronts. Under this contract we developed an Eulerian level set based method, solving for the wave fronts using both space and phase.
DTIC
High Frequencies; Numerical Analysis; Radar Cross Sections; Schroedinger Equation; Wave Propagation

20080041692 Michigan State Univ., East Lansing, MI USA
Classification, Clustering and Dimensionality Reduction
Jain, Anil K; Jul 8, 2008; 4 pp.; In English
Contract(s)/Grant(s): N00014-04-1-0183
Report No.(s): AD-A483964; MSU-ONR-06-F; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483964

The primary goal of pattern recognition is supervised or unsupervised classification. Among the various frameworks in which pattern recognition has been traditionally formulated, the statistical approach has been most intensively studied and used in practice. The design of a recognition system requires careful attention to the following issues: feature extraction and selection, cluster analysis, and classifier design and learning. In spite of almost fifty years of research and development in this field, the general problem of recognizing complex patterns with arbitrary orientation, location, and scale remains unsolved. New and emerging applications, such as data mining, web searching, retrieval of multimedia data, face recognition and cursive handwriting recognition, require robust and efficient pattern recognition techniques. The objective of this research proposal is to investigate the following important problems in pattern recognition: (1) classifier evaluation, (2) one-class classification, (3) combination of clustering algorithms, and (4) dimensionality reduction. Solution to these problems will advance the state-of-the-art in pattern recognition, data mining and machine learning. These advances will also be useful to a number of pattern recognition and data mining applications of interest to the Navy.
DTIC
Classifications; Pattern Recognition

20080041823 Utah State Univ., Logan, UT USA
Autonomous Quality Space Imagery for LEO/GEO Space Operations
Geller, David K; McInroy, John; Jun 1, 2008; 21 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-07-1-0265
Report No.(s): AD-A484180; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Our overall goal is to develop, implement and transfer accurate new numerical methods for solving moving boundary problems in materials science. We have three specific objectives: (1) Combine semi-Lagrangian time stepping, accurate contouring and fast geometric algorithms to develop and implement accurate, efficient and general new methods for moving sharp interfaces; (2) Develop a fast modular open source moving interface code for transfer to other researchers, labs and industry; (3) Build efficient, accurate and general integral solvers for coupled systems of partial differential equation (PDEs) modeling common material phenomena, and couple these solvers to our modular moving interface code.
DTIC
Algorithms; Autonomous Navigation; Autonomy; Image Processing; Low Earth Orbits; Space Missions; Spaceborne Photography

20080041824 Florida Univ., Gainesville, FL USA
Eavesdropping (or Jamming) of Communication Networks
Uryasev, Stanislav; Dec 2007; 47 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-05-1-0137
Report No.(s): AD-A484184; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This report presents research on optimization formulations for jamming wireless communication networks. The first chapter addresses deterministic situations which were the focus of the first research year. In particular, several formulations of the deterministic Wireless Network Jamming Problem were derived and theoretical proof of problem statements equivalences were obtained. The second year addressed situations in which a network is to be jammed, but no apriori information (i.e., topology, number of nodes, etc.) were assumed known. Proofs of upper and lower bounds on the required number of jamming devices as well as convergence results were derived. A heuristic for this setup was also proposed, During the third year the robust optimization formulation were researched. Information such as the number and placement of the communication nodes and other parameters were considered subject to some uncertainty.
DTIC
Communication Networks; Jamming; Wireless Communication

20080041837 California Univ., Berkeley, CA USA
Fast Solvers for Moving Material Interfaces
Strain, John; Jan 2008; 9 pp.; In English
Contract(s)/Grant(s): F49620-02-1-0160; FA9550-05-1-0160
Report No.(s): AD-A484221; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Our overall goal is to develop, implement and transfer accurate new numerical methods for solving moving boundary problems in materials science. We have three specific objectives: (1) Combine semi-Lagrangian time stepping, accurate contouring and fast geometric algorithms to develop and implement accurate, efficient and general new methods for moving sharp interfaces; (2) Develop a fast modular open source moving interface code for transfer to other researchers, labs and industry; (3) Build efficient, accurate and general integral solvers for coupled systems of partial differential equation (PDEs) modeling common material phenomena, and couple these solvers to our modular moving interface code.
DTIC
Algorithms; Boundary Value Problems; Coding; Partial Differential Equations

20080041842 Muroran Inst. of Tech., Japan
Study of Unsteady Interactions between Gases and Solid Particles
Saito, Tsutomu; Saba, M; Sun, M; Takayama, K; Aug 30, 2007; 14 pp.; In English
Contract(s)/Grant(s): FA4869-06-1-0042
Report No.(s): AD-A484229; No Copyright; Avail.: Defense Technical Information Center (DTIC)

For numerical analysis of shock wave propagation in gas-particle mixtures, drag coefficients of a sphere in steady flows are generally used. However, it is shown both experimentally and numerically that a shock loaded solid sphere experiences unsteady drag forces. The paper describes a model of unsteady drag force and its effect on the structure of the non-equilibrium region behind a shock front traveling in a dusty gas. The results are compared with those obtained by using a steady drag coefficient and are discussed. It is demonstrated that the large drag force at the early stage of the interaction between shock-wave induced flow and a solid particle affects the flow structure that is obtained with a steady drag force.
DTIC
Gases; Wave Propagation

20080041844 Brown Univ., Providence, RI USA
Novel Approaches to the Modeling and Computations of Wave Phenomena
Gottlieb, David; Hesthaven, Jan; Jun 3, 2008; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-05-1-0108
Report No.(s): AD-A484234; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The aim of this project was to develop and study numerical methods for solutions of hyperbolic equations that include uncertainties. In particular, application to electromagnetic waves have been considered.
DTIC
Hyperbolic Differential Equations; Numerical Analysis

20080041851 North Carolina State Univ., Raleigh, NC USA
New Directions in Complex Data Analysis for Emerging Applications
Krim, Hamid; Jun 13, 2008; 23 pp.; In English
Contract(s)/Grant(s): FA9550-07-1-0438
Report No.(s): AD-A484243; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The workshop was organized into four thematic sessions including interdisciplinary trends, algebraic geometry, differential geometry and statistics, and topological and geometric features of data. The invited speakers were directed to consider the workshop as a visionary forum. The presentations were all limited to ten minutes with an emphasis on new directions, open problems, and provocative speculation. These were followed by breakout sessions where the presented material was further discussed in small groups. The charge to the participants was to provide concrete and coherent recommendations for new research directions.
DTIC
Data Processing; Systems Analysis

20080041873 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA USA

High Performance Parallel Algorithms for Improved Reduced-Order Modeling

Beattie, Christopher A; Borggaard, Jeffrey T; Gugercin, Serkan; Iliescu, Traian; May 4, 2008; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-0449; Proj-208-11-110-335-353-1

Report No.(s): AD-A484306; VPI-05-1901-04; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We describe the development of a reliable parallel algorithm and software tools that utilize flow-adapted KLE/POD representations and that are able to take advantage of distributed data formats on cluster/grid computer architectures. The associated module functions efficiently within the context of current best practices of fluid flow simulation. Additionally, we describe methods that lead to greater predictive capability and extend the range of flows for which KLE/POD-based methods are effective. Model reduction methods used for linear input-output systems based on a rational Krylov framework were also studied. We propose new investigations informed both by approximate inertial manifold approaches and by energy-based turbulence modeling/LES approaches capable of accounting for the effect of small scale dynamic structures.

DTIC

Algorithms; Architecture (Computers); Parallel Processing (Computers); Software Development Tools

20080041905 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA

Identification and Detection of Bacterial Spores With a Passive FTIR in an Open Air Point Release

Ben-David, Avishai; D'Amico, Francis M; Ren, Hsuan; Emge, Darren K; Samuels, Alan C; Jensen, James O; Loerop, William R; Jul 1, 2003; 22 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAM01-94-C-0079

Report No.(s): AD-A484399; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A simple experiment was conducted in order to test the feasibility of a high-sensitivity Fourier transform infrared (FTIR) spectrometer a passive infrared spectrometer to measure open air point release of dry Bacillus subtilis var. niger (BG) spores. The release was partially contained in order to provide a stable cloud. Measurements were taken continuously through a horizontal line of sight with a complex background (sky and mountains at a distance of a few tens of kilometers) at a distance of 50 meters. The temperature difference (background to ambient air) was a few degrees Kelvin. Advanced identification and detection algorithms, based on radiative transfer theory and statistical signal processing methods were developed and used during the experiment. The deduced absorption spectra (Identification) show an excellent match to a BG absorption spectrum and thus indicate that the released material was BG. Analysis of the time sequence of the measurements via an adaptive detection threshold coincides very well (Detection) with the presence of the BG during the measurements. For completion we also show measurements of Kaolin dust where the ability to distinguish between the spectrum of BG and Kaolin is shown. Our experiment and analysis clearly show the feasibility of passive remote sensors to detect and identify BG particles. These results are encouraging and more experiments to validate our models and to explore their limitations are planned.

DTIC

Bacillus; Bacteria; Fourier Transformation; Infrared Spectra; Spores

20080041908 Guanajuato Univ., Guanajuato, Mexico

An Optimal FIR Filtering Algorithm for a Time Error Model of a Precise Clock

Shmaliy, Yuriy; Ibarra-Manzano, Oscar; Jan 2003; 13 pp.; In English

Report No.(s): AD-A484410; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This report is a comparative study of the GPS-based parameter estimates of the precise local clock linear time model. We estimate the time error x and fractional frequency offset y employing the finite impulse response 'FIR' digital filters, namely: the simple moving average 'MA', the second order low pass 'LP', and the optimally unbiased 'OU'. The estimates are provided analytically, and we show that, in terms of a minimum root-mean-square error 'RMSE', the simple MA is best to use for x estimates when 0 <= y < y1 , the second-order LP FIR is best if 1 2 y < y < y , and the OU is best for y < y 2 , where 1 y and 2 y are determined constants. Finally, we present an optimal FIR algorithm for the precise clock linear time error model and show that of all the estimators, including the Kalman, the presented algorithm yields minimum RMSE of the fractional frequency offset.

DTIC

Algorithms; Clocks; Error Analysis; Errors; Global Positioning System; Time Measurement

20080041911 Naval Research Lab., Washington, DC USA

CANVAS: Clock Analysis, Visualization, and Archiving System A New Software Package for the Efficient Management of Clock/Oscillator Data

Senior, K; Beard, R; White, J; Aug 2005; 6 pp.; In English; Original contains color illustrations

Report No.(s): AD-A484420; XB-NRL/MR/8150; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Few software packages exist which address the particular needs of the time and frequency community in analyzing and simulating clocks or oscillators. None is open source. We offer the source code for a set of tools which aims to incorporate commonly used clock analysis and simulation algorithms. The goal of this release is to promote further development of the package by distributing the effort.

DTIC

Algorithms; Applications Programs (Computers); Clocks; Oscillators

20080041912 National Standard Time and Frequency Lab., Taoyuan, Taiwan, Province of China

An Improvement of the Controlling Algorithm for Taiwan's Time Scaling System

Lin, Shinn-Yan; Chang, Po-Cheng; Aug 2005; 5 pp.; In English; Original contains color illustrations

Report No.(s): AD-A484422; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Telecommunication Laboratories (TL, Taiwan) developed a new controlling algorithm to improve the shortterm and mid-term stability of TL's time scaling system. The controlling algorithm is used for controlling a micro-phase stepper to constrict its output followed a reference paper clock, Taiwan's local atomic time scale - TA(TL). The original system used frequently p-control adjustment to keep the system almost synchronized with the reference paper clock. The new algorithm used a derivate control mode to set the long term frequency offset of the micro-phase-stepper, and used a proportional control mode to adjust the daily phase deflection. The new algorithm improve the short-term stability of the system from 1e-13 into 4.6e-14 when the average time = 600 seconds; and the long-term Allan deviation still constrained with paper clock, up to 2e-15 when the average time is more than 7 days.

DTIC

Algorithms; Atomic Clocks

65
STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; time series analysis; and stochastic processes.

20080041065 Army Engineer Research and Development Center, Vicksburg, MS USA

Estimation of Wave Run-up on Smooth, Impermeable Slopes using the Wave Momentum Flux Parameter

Hughes, Steven A; Jul 16, 2004; 21 pp.; In English

Report No.(s): AD-A483144; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483144

This paper re-examines existing wave run-up data for regular, irregular and solitary waves on smooth, impermeable plane slopes. A simple physical argument is used to derive a new wave run-up equation in terms of a dimensionless wave parameter representing the maximum, depth-integrated momentum flux in a wave as it reaches the toe of the structure slope. This parameter is a physically relevant descriptor of wave forcing having units of force. The goal of the study was to provide an estimation technique that was as good as existing formulas for breaking wave run-up and better at estimating nonbreaking wave run-up. For irregular waves breaking on the slope, a single formula for the 2% run-up elevation proved sufficient for all slopes in the range 2/3less thantanalphaless than1/30. A slightly different formula is given for nonbreaking wave run-up. In addition, two new equations for breaking and nonbreaking solitary maximum wave run-up on smooth, impermeable plane slopes are presented in terms of the wave momentum flux parameter for solitary waves. This illustrates the utility of the wave momentum flux parameter for nonperiodic waves.

DTIC

Coasts; Momentum; Slopes; Water Waves

20080041158 Raytheon Systems Co., El Segundo, CA USA

How Extracting Information from Data Highpass Filters Its Additive Noise

Reinhardt, Victor S; Nov 2007; 23 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483372; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483372

We examines characteristics of three types of random error measures in presence of negative power law (neg-p) noise:

(a) observable residual error after removing an estimate of an information containing causal function from data, (b) jitter, the residual error with additional highpass (HP) filtering, and (c) Mth-order difference (delta) variances, such as the Allan variance (1st-order delta-variance of the fractional frequency error y(t)) and the Hadamard-Picinbono variance (2nd-order delta-variance of y(t)). Measures (b) and (c) are used to mitigate perceived divergence problems in the mean square (MS) of Measure (a) due to the presence of neg-p noise. This paper proves that this perception is wrong; it shows that the MS of Measure (a) converges in the presence of neg-p noise by demonstrating that extracting a statistically optimal estimate of the causal behavior from data HP filters the noise in the measure. It is further shown that the order of this noise HP filtering increases with the complexity of the model function used to estimate the causal behavior in the data. Thus, if one is free to choose the complexity of the model function, the MS observable residual error is guaranteed to converge for any negative power in the noise PSD. Because of this, it is shown that jitter can be defined simply as observable residual error without additional HP filtering, making jitter and residual error the same error measure. The paper finally shows that an Mth-order delta-variance is also a measure of the MS of observable residual error for any number of data samples when the model function is an (M-1)th-order polynomial. This completes the equivalence, showing Measures (a), (b), and (c) all measure the same kind of error when the model function for causal behavior is a polynomial. The consequences of this equivalence then explored. Among these is a physical explanation for the fact that Allan variance is sensitive to frequency drift, while Hadamard-Picinbono variance is not.
DTIC
Additives; Analysis of Variance; Error Analysis; Errors; Signal Processing

20080041259 Naval Postgraduate School, Monterey, CA USA
Numerical Simulation Investigations in Weapon Delivery Probabilities
Peterson, Kristofer A; Jun 2008; 85 pp.; In English
Report No.(s): AD-A483491; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The study of weapon delivery probabilities has historically been focused around analytical solutions and approximations for weapon delivery accuracy and effectiveness calculations. With the relatively recent increase in modern computing power many of the historical expressions can be simulated quickly with similar or more accurate results than the historical expressions and approximations. In this thesis simulation methods are used to evaluate weapon delivery probability parameters including circular error probable, range and deflection error probable, and weapon effectiveness in the single and salvo weapon scenarios. Comparisons of the simulation results and corresponding historical practices are made to validate simulation techniques. Additionally, standard deviations in the range and deflection direction are extracted from weapon impact data. Using these extracted standard deviations weapon effectiveness calculations are performed.
DTIC
Probability Theory; Simulation; System Effectiveness; Weapon Systems; Weapons Delivery

20080041269 Naval Postgraduate School, Monterey, CA USA
An Analysis of the Factors Generating the Variance Between the Budgeted and Actual Operating Results of the Naval Aviation Depot at North Island, California
Curran, Thomas; Schimpff, Joshua J; Jun 2008; 87 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483507; No Copyright; Avail.: Defense Technical Information Center (DTIC)

For six of the past eight years, naval aviation depot-level maintenances activities have encountered operating losses that were not anticipated in the Navy Working Capital Fund (NWCF) budgets. These unanticipated losses resulted in increases or surcharges to the stabilized rates as an offset. This project conducts a variance analysis to uncover possible causes of the unanticipated losses. The variance analysis between budgeted (projected) and actual financial results was performed on financial data collected on the E-2C aircraft program from Fleet Readiness Center Southwest (FRCSW) located in San Diego, California. The results of the variance analysis are interpreted and discussed in terms of labor sales quantity, mix, and rate variances, material sales variance, material expense variance, labor, production overhead, and general and administrative rate/spending and quantity variances. The results of this project reveal the factors that created the greatest variance in FRCSW's net operating results. The variance analysis suggests that the factors having the greatest affect on the operating results were the material sales variances, material expense variances, and the variances due to the quantity of work. Additionally, the analysis revealed that during the year analyzed (FY 2007) FRCSW was not reimbursed for 21 percent of its material costs.
DTIC
Aircraft Carriers; Analysis of Variance; Military Aviation

20080041329 Naval Postgraduate School, Monterey, CA USA

Multivariate Analysis of the Effect of Source of Supply and Carrier on Processing and Shipping Times for Issue Priority Group One Requisitions

Sagara, Gavan M; Jun 2008; 155 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483653; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This thesis investigates the effects of source of supply and carrier on the delivery times of high-priority requisitions to primary destinations of Navy, Military Sealift Command, USMC ground forces, and select U.S. Coast Guard units operating in the Fifth, Sixth, and Seventh Fleet Areas of Operation, and major Fleet concentration areas within the USA. The primary focus is on determining whether source of supply, carrier, and the interaction of these two factors have an effect on processing times and shipping times of high-priority requisitions. 'Source of supply' refers to a Department of Defense distribution depot and 'carrier' refers to a shipper, such as Federal Express (trademark), DHL Worldwide Express (trademark), United Parcel Service, Inc. (trademark), Air Mobility Command, and commercial freight forwarders. The data used in the study were taken from the Priority Material Office's requisition database for the period Feb 2005-Feb 2008. The study included 11 primary overseas destinations (Atsugi, Bahrain, Guam, Hong Kong, Mildenhall (UK), Okinawa, Rota, Sasebo, Sigonella, Singapore, and Yokosuka) and 8 primary CONUS destinations (Bangor/Bremerton, Everett, Groton, Kings Bay, Mayport, Norfolk, Pearl Harbor, and San Diego). The study used Ordinary Least Squares (OLS) linear models, Generalized Linear Models (GLMs), and nonparametric methods to explore the structure of the requisition datasets. OLS linear models were found to be inadequate, but both the GLMs and nonparametric tests proved to be valid and yielded results from which inferences could be made. The GLM and nonparametric test results indicate that source of supply has a statistically significant effect on processing times of high-priority requisitions, and that source of supply and carrier each have a statistically significant effect on shipping times to certain destination areas. The GLMs also indicate that there is no significant interaction between source of supply and carrier.

DTIC

Logistics; Logistics Management; Military Operations; Multivariate Statistical Analysis; Priorities

20080041676 Library of Congress, Washington, DC USA

Iraqi Civilian Casualties Estimates

Fischer, Hannah; May 16, 2008; 6 pp.; In English

Report No.(s): AD-A483915; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483915

This report presents various governmental and nongovernmental estimates of Iraqi civilian dead and wounded. The Department of Defense (DOD) regularly updates total U.S. military death and wounded statistics from Operation Iraqi Freedom (OIF), as reflected in CRS Report RS21578, Iraq: Summary of U.S. Casualties. However, no Iraqi or U.S. government office regularly releases publically available statistics on Iraqi civilian deaths or civilians who have been wounded. Statistics on Iraqi civilian dead and wounded are sometimes available through alternative sources, such as nonprofit organizations, or through statements made by officials to the press. Because these estimates are based on varying time periods and have been created using differing methodologies, readers should exercise caution when using these statistics and should look on them as guideposts rather than as statements of fact. See also CRS Report RS22532, Iraqi Police and Security Forces Deaths Estimates. This report will be updated as needed.

DTIC

Casualties; Estimates; Iraq

20080041691 RAND Corp., Santa Monica, CA USA

Dealing with Uncertainty Arising Out of Probabilistic Risk Assessment

Solomon, Kenneth A; Kastenberg, William E; Nelson, Pamela F; Sep 1983; 65 pp.; In English

Report No.(s): AD-A483960; RAND/R-3045-ORNL; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483960

The Nuclear Regulatory Commission (NRC), like many other regulatory bodies, often must decide whether some system or some overall technology satisfies a prescribed safety goal. The NRC makes these decisions on the basis of probabilistic risk assessments (PRAs). The objective of a PRA is to quantify the risk of occurrence of some undesirable event, such as a reactor core melt, or of some undesirable consequence of an event, in this example, death. The quantified risk is expressed as a probability, e.g. , one core melt expected per 10,000 reactors per year. Estimates of risk are subject to uncertainty. This uncertainty arises from variability in available data on failure rates, difficulties in predicting the effects of unusually stressing events external and internal to the system being assessed, and an insufficient data base on human errors in uncommon

situations. Therefore, the actual risk that a part. a system, or a plant will fail may be greater or lesser than the PRA's best estimate of the risk. Indeed, there is associated with each possible risk value a probability that that value is the right one, and it is thus possible to construct a frequency distribution of probabilities over all possible risk values. Past PRAs have equated the best estimate of the risk, that is, the value to be used in comparing the risk to the safety goal, with the median risk value in the frequency distribution, i.e. the median of the set of all possible risk values when weighted by their associated probabilities. It has been suggested that the mean risk value be used instead, because the mean is usually larger than the median in risk-frequency distributions, which generally include some relatively high values with nonnegligible probabilities.
DTIC
Probability Theory; Risk; Risk Assessment

20080041709 RAND Corp., Santa Monica, CA USA
Authentication by Keystroke Timing: Some Preliminary Results
Gaines, R S; Lisowski, William; Press, S J; Shapiro, Norman; May 1980; 52 pp.; In English
Contract(s)/Grant(s): MCS76-00720
Report No.(s): AD-A484022; RAND-R-2526-NSF; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484022

The growing use of computers to store sensitive, private, and classified information makes it increasingly important to be able to determine with a very high degree of confidence the identity of an individual seeking access to the computer. This report summarizes preliminary efforts to establish whether an individual can be identified by the statistical characteristics of his or her typing. Can people be identified by the way they type? To investigate this question, an experiment was carried out at Rand, in which seven professional typists were each given a paragraph of prose to type, and the times between successive keystrokes were recorded. This procedure was repeated 4 months later with the same typists and the same paragraph of prose. By examining the probability distributions of the times each typist required to type certain pairs of successively typed letters (digraphs), the authors found that of the large number of digraphs represented in most ordinary paragraphs, there were five which, considered together, could serve as a basis for distinguishing among the subjects. The implications of this finding are that touch typists appear to have a typing 'signature,' and that this method of distinguishing subjects might provide the basis for a computer authentication system.
DTIC
Access Control; Computer Information Security; Computers; Numerical Control; Operators (Personnel); Signatures; Statistical Analysis

20080042118 Florida Inst. of Tech., Melbourne, FL USA
Wireless Channel Modeling Based on Finite-State Markov Model
Chen, Chang-Wen; Jul 2008; 19 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-07-2-0025; Proj-BATC
Report No.(s): AD-A484232; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The main objective of the overall proposed research was to develop a robust video communication over Airborne Networks that are operational under time varying and error prone battlefield environments with limited bandwidth and potentially transmitting/receiving with mobile and portable devices. The overall robust video communication system aiming at providing high performance video transmission under dynamic and time varying Airborne Networks will be explained in the technology background section. The objective of the first phase of this project is to develop a channel simulation toolset that is able to capture some major characteristics of the Airborne Networks. The team at the Florida Institute of Technology has been able to implement a wireless channel simulation based on Finite-State Markov Model to simulate and analyze the error and loss characteristics. The simulation is currently based on command line execution.
DTIC
Networks; Telecommunication; Video Communication; Video Signals

20080042181 Air Force Research Lab., Hanscom AFB, MA USA
Use of Eigenvector-Generated Scatter Plots in Clustering Image Data
Silverman, Jerry; Caefer, Charlene; Jul 28, 2008; 27 pp.; In English
Contract(s)/Grant(s): Proj-2305
Report No.(s): AD-A483978; AFRL-RY-SH-TR-2008-0005; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483978

Over the last few years we have been analyzing state-of-the-art spectral /temporal data of many events. Our goal was to

develop specific techniques to classify and identify events based on these measurements. While the techniques evolved from one data type, we focus in this paper on the technique itself and its potential efficacy when applied to other data types. We use a Singular Value Decomposition (SVD) technique to cluster like events by forming a scatter plot from the first two eigenvectors. An evaluation of this approach using real data as well as simulations is given. A novel technique is introduced to assess cluster stability in the absence of ground truth. Results are presented along with the effects of misalignment of data samples, compression, training sets, and classifiers. The overall methodology is quite powerful and has remarkable noise immunity.
DTIC
Eigenvectors; Image Processing

66
SYSTEMS ANALYSIS AND OPERATIONS RESEARCH

Includes mathematical modeling of systems; network analysis; mathematical programming; decision theory; and game theory.

20080041124 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Determining the Surface-to-Air Missile Requirement for Western and Southern Part of the Turkish Air Defense System
Alkanat, Omer; Mar 2008; 144 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483275; AFIT/GOR/ENS/08-01; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483275

An air defense system is vital for any country that wants to protect its homeland. Today, air defense systems are integrated systems that consist of early warning radars, fighter aircraft, airborne early warning aircraft, and surface-to-air missiles (SAMs). The Turkish air defense system does not as yet have long-range SAMs, but Turkey plans to procure SAM systems to protect its borders. This research develops two location optimization models to optimally locate SAM sites to defend specified areas of the country. One of the models finds the minimum number of SAM sites needed to cover the specified areas; the other finds the maximum coverage for a given number of SAM sites. The model is formulated as an integer program, and the LINGO 10 software package is used to solve the model. Three candidate SAM systems are examined. All models use the maximum range of each SAM system. Sensitivity analysis is used to explore how much the optimal solution(s) change given fluctuations in input values. The main objective of the study is to provide the Turkish Air Force coverage information regarding the three candidate SAM systems. The study also provides a model that can be used to examine other candidate systems. The results and models presented in this research should facilitate the development of a more effective air defense system for Turkey.
DTIC
Air Defense; Amount; Launching Sites; Position (Location); Surface to Air Missiles

20080041139 Offshore and Coastal Technologies, Inc., Chadds Ford, PA USA
Implementation of a Regional Wave Measurement and Modeling System, South Shore of Long Island, New York
Grosskopf, William G; Kraus, Nicholas C; Militello, Adele; Bocamazo, Lynn M; Jan 2001; 11 pp.; In English
Report No.(s): AD-A483315; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483315

This paper describes the wave measurement and numerical modeling components of a regional monitoring and modeling system established for the south shore of Long Island, New York. The monitoring portion was begun in April 1998 and has produced a wealth of data on waves, currents, water level, and soundings at inlets. A directional spectral wave model incorporating nested grids with fine resolution at inlets provides an efficient and accurate means of calculating nearshore waves. Validation of the modeling system is presented, together with discussion of the managerial functions of the data and model.
DTIC
Long Island (NY); Mathematical Models; Sediment Transport

20080041282 Illinois Univ., Urbana-Champaign, IL USA
Online Efficient Predictive Safety Analysis of Multithreaded Programs
Sen, Koushik; Rosu, Grigore; Agha, Gul; Jan 2005; 16 pp.; In English
Contract(s)/Grant(s): F30602-00-2-0586; F33615-01-C-1907
Report No.(s): AD-A483547; No Copyright; Avail.: Defense Technical Information Center (DTIC)

An automated and configurable technique for runtime safety analysis of multithreaded programs is presented, which is

able to predict safety violations from successful executions. Based on a user provided safety formal specification, the program is automatically instrumented to emit relevant state update events to an observer, which further checks them against the safety specification. The events are stamped with dynamic vector clocks, enabling the observer to infer a causal partial order on the state updates. All event traces that are consistent with this partial order, including the actual execution trace, are analyzed on-line and in parallel, and a warning is issued whenever there is a trace violating the specification. This technique can be therefore seen as a bridge between testing and model checking. To further increase scalability, a window in the state space can be specified, allowing the observer to infer the most probable runs. If the size of the window is 1 then only the received execution trace is analyzed, like in testing; if the size of the window is then all the execution traces are analyzed, such as in model checking.
DTIC
On-Line Systems; Predictions; Probability Theory; Safety

20080041462 California Univ., Berkeley, CA USA
Optimal Real-time Dispatch for Integrated Energy Systems
Firestone, R. M.; Apr. 2007; 252 pp.; In English
Report No.(s): DE2007-918499; No Copyright; Avail.: National Technical Information Service (NTIS)

This report describes the development and application of a dispatch optimization algorithm for integrated energy systems (IES) comprised of on-site cogeneration of heat and electricity, energy storage devices, and demand response opportunities. This work is intended to aid commercial and industrial sites in making use of modern computing power and optimization algorithms to make informed, nearoptimal decisions under significant uncertainty and complex objective functions. The optimization algorithm uses a finite set of randomly generated future scenarios to approximate the true, stochastic future; constraints are included that prevent solutions to this approximate problem from deviating from solutions to the actual problem. The algorithm is then expressed as a mixed integer linear program, to which a powerful commercial solver is applied.
NTIS
Algorithms; Cogeneration; Integrated Energy Systems; Real Time Operation

20080041651 Kansas State Univ., Manhattan, KS USA
A Test-bed for Intelligent, Mobile Sensor Applications
DeLoach, Scott A; Singh, Gurdip; Jun 23, 2008; 8 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-07-1-0294
Report No.(s): AD-A483856; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483856

The goal of this effort was to design, develop, and acquire a well-equipped platform for experimental evaluation of intelligent, mobile sensor network application to enhance our research. The equipment purchased included three Pioneer all-terrain robots as well as several smaller, more limited robots. Also acquired was a collection of off-the-shelf sensors and sensor kits for large scale experiments including Crossbow Technology Inc's Mote kits (which include MICA motes, sensor and acquisition boards, and development tools), digital cameras, and interface boards (e.g. Crossbow's gateways). Finally, several laptop and handheld computers that will be used as processing nodes and/or to act as controllers/monitors for the robot and sensor systems were also purchased. The purchased equipment has already been used in pursuit of several projects including the development of several mobile sensor networking systems, model-driven tools for developing sensor networks, and a DoD project to demonstrate single users to control robot teams.
DTIC
Robots; Systems Integration; Test Stands

20080041696 CFD Research Corp., Huntsville, AL USA
A Computational Framework for Multi-Scale Simulations of Weakly Ionized Plasma
Kolobov, V I; Arslanbekov, R R; Wichaidit, C; Hitchon, W N; Kovalev, V F; Jun 30, 2008; 31 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-07-C-0069
Report No.(s): AD-A483975; CFDRC-8840-03; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483975

The goal of this STTR project is to develop a unified computational framework integrating adequate physical models for simulating complex non-equilibrium plasmas. The project aims to classify possible scenarios of plasma dynamics and develop

general recipes for clustering phase space into sub-domains evolving at different scales and efficiently solve the dynamics for each scale. During Phase I, we developed a methodology to apply methods of Invariant Manifolds and the Renormalization Group for reduced description of plasma kinetics and the transition from micro to macro. We have tested state-of-the-art deterministic Eulerian and Lagrangian kinetic solvers (Vlasov, Pokker-Planck, Poltzmann) , investigated new algorithms (such as adaptive mesh in velocity space) and implemented basic plasma capabilities within the Adaptive Mesh and Algorithm Refinement framework. We prepared Phase II work plan where the proposed methodology could he fully developed and implemented in the next generation software for multi-scale plasma simulations. The new capabilities would be valuable for low-pressure weakly-collisional plasma systems with stochastic electron heating and anomalous skin effect, and for high-pressure discharges with runaway electrons, e-beams, sparks and streamers.
DTIC
Plasmas (Physics); Simulation

20080041802 Illinois Univ., Urbana, IL USA
Error and Uncertainty Analysis for Ecological Modeling and Simulation
Gertner, George; Dec 2001; 154 pp.; In English
Report No.(s): AD-A484138; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Strategic Environmental Research and Development Program (SERDP) was initiated in 1990 to harness the resources of the defense establishment to minimize or remove any negative environmental impacts associated with Department of Defense's (DoD) primary mission of maintaining military readiness for national defense. SERDP is a cooperative program under the DoD in full partnership with the Department of Energy and the Environmental Protection Agency, and with participation by numerous other Federal and non-Federal organizations. SERDP consists of environmental compliance, cleanup, pollution reduction, and conservation programs. Its objectives are to accelerate cost-effective clean up of contaminated defense sites, facilitate full compliance with environmental laws and regulations, enhance training, testing, and operational readiness through prudent conservation measures, and reduce defense industrial waste streams through aggressive pollution prevention. Application of the innovative environmental technologies developed by SERDP should reduce the costs of sustainable environmental and resource management, save the time required to resolve environmental problems, and enhance safety and health.
DTIC
Ecology; Environment Models; Environmental Surveys; Error Analysis; Simulation

20080041806 Army Cold Regions Research and Engineering Lab., Hanover, NH USA
Ice Considerations in the Design of River Restoration Structures
Tuthill, Andrew M; Feb 2008; 35 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484149; ERDC/CRREL-TR-08-2; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Modern river restoration and streambank stabilization projects constructed of natural materials are gaining favor over traditional materials such as riprap and concrete. These new structure types provide a more aesthetic and lower-cost means of controlling bed and bank erosion, while improving flow diversity and habitat. Little design guidance exists for these structures on ice-affected rivers, however. This report provides basic design guidelines for these in-stream structures in the ice environment. Critical design questions are whether the structure or project will cause ice jams where none occurred before and also how well the structures will survive ice processes. For the freezeup period, simple water velocity and ice arching theory may be adequate to predict whether an in-stream structure will retain or pass ice. Predicting the structures effect on breakup ice jam formation is much more difficult and, because of this uncertainty, it is recommended that designers avoid locating these types of in-stream structures in sections of river known for destructive breakup ice jams and ice jam flooding.
DTIC
Ice; Ice Formation; Restoration; Rivers; Rocks

20080041878 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Dynamic Protocol Reverse Engineering: A Grammatical Inference Approach
DeYoung, Mark E; Mar 2008; 167 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-JON-08-159
Report No.(s): AD-A484312; AFIT/GCS/ENG/08-06; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Round trip engineering of software from source code and reverse engineering of software from binary files have both been

extensively studied and the state-of-practice have documented tools and techniques. Forward engineering of protocols has also been extensively studied and there are firmly established techniques for generating correct protocols. While observation of protocol behavior for performance testing has been studied and techniques established, reverse engineering of protocol control flow from observations of protocol behavior has not received the same level of attention. State-of-practice in reverse engineering the control flow of computer network protocols is comprised of mostly ad hoc approaches. We examine state-of-practice tools and techniques used in three open source projects: Pidgin, Samba, and rdesktop. We examine techniques proposed by computational learning researchers for grammatical inference. We propose to extend the state-of-art by inferring protocol control flow using grammatical inference inspired techniques to reverse engineer automata representations from captured data flows. We present evidence that grammatical inference is applicable to the problem domain under consideration.
DTIC
Computer Networks; Inference; Protocol (Computers); Reverse Engineering

20080042182 Calspan-Buffalo Univ. Research Center, NY USA
Investigation of Means of Mitigating Congestion in Complex, Distributed Network Systems by Optimization Means and Information Theoretic Procedures
Mufalli, Frank; Nagi, Rakesh; Llinas, Jim; Mishra, Sumita; Lawless, W F; Feb 2008; 99 pp.; In English
Contract(s)/Grant(s): FA8650-06-1-6745; Proj-7184
Report No.(s): AD-A483777; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483777

This work investigates how the values of network metrics affect congestion in wireless ad-hoc networks. The metrics considered in this work are average path length, average degree, clustering coefficient, and offdiagonal complexity. Based on the levels of these metrics, insight is provided on the clustering algorithm to choose what will minimize congestion. Congestion is evaluated using a node betweenness measure and the candidate clustering algorithms are lowest ID, highest degree, and MOBIC. To obtain data for analysis, a network simulator was developed using Microsoft Visual C++ 2005. The simulator is capable of creating networks of varying complexity, clustering these networks using the aforementioned algorithms, and evaluating each of the five metrics. Analysis of the results confirmed that congestion levels increase with complexity. This was evidenced by evaluation of all five network metrics. Also, networks with relatively low levels of complexity will have minimal congestion, regardless of the clustering method used.
DTIC
Complex Systems; Congestion; Information Theory; Topology; Wireless Communication

20080042186 Rutgers - The State Univ., Newark, NJ USA
Interacting Brain Modules for Memory: An Adaptive Representations Architecture
Gluck, Mark A; Jun 2008; 21 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-05-2-0273; DARPA ORDER-V027; Proj-BICA
Report No.(s): AD-A483802; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483802

An innovative and novel biologically-based computational model of interacting brain modules for memory, using the adaptive representations architecture of Gluck & Myers (1993; see also, 2001, Gateway to Memory: An Introduction to Neural Network Models of the Hippocampus and Learning, MIT Press) has been developed. The approach began with a connectionist-level architecture for the hippocampal region (medial temporal lobe) as a central system for creating optimal and adaptive stimulus representations, and then worked outwards from the hippocampal region to the brain systems that it modulates, including the cerebellum, cerebral cortex, basal ganglia, as well as other structures which, themselves, reciprocally modulate the hippocampus (ventral tegmental area/VTA, medial septum of the basal forebrain). Ultimately, this defined a novel biologically-inspired and constrained architecture for the neural substrates of a broad range of learning and memory behaviors and capabilities.
DTIC
Brain; Computer Storage Devices; Modules

67
THEORETICAL MATHEMATICS

Includes algebra, functional analysis, geometry, topology, set theory, group theory and number theory.

20080041260 Naval Postgraduate School, Monterey, CA USA
Mathematical Modeling and Optimal Control of Battlefield Information Flow
Phillips, Donovan D; Jun 2008; 161 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483492; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The U.S. Army's Future Force requires information dominance to succeed, yet finds itself with an ever-increasing gap between its capacity to collect information and its information processing capacity with little understanding of how to efficiently utilize scarce processing resources. In this investigation, a model is proposed to adequately represent the flow of information within a command and control context toward the end of optimally controlling this flow. The model is conjectured to be NP-hard in general. Closed-form optimal solutions are derived for special cases of the model, while other cases are shown to be NP-hard. A case of the model is shown to equate to a special case of the quadratic assignment problem not previously known to have a closed-form solution, and such a solution is derived. Upper and lower bounds are derived for more general cases of the model, and heuristic strategies are proposed and tested in discrete event simulation. Strong empirical evidence is produced to demonstrate the effectiveness and robustness of one heuristic.
DTIC
Data Processing; Information Flow; Mathematical Models; Optimal Control

20080041845 Delaware Univ., Newark, DE USA
Space-Time Coding Using Algebraic Number Theory for Broadband Wireless Communications
Xia, Xiang-Gen; May 31, 2008; 18 pp.; In English
Contract(s)/Grant(s): FA9550-05-1-0161
Report No.(s): AD-A484235; UODECE-1-5-08; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This report describes the main research achievements during the time period cited above on the research project in the area of wireless communications. The main achievements include new space-time/frequency code designs based on algebraic number theory, new space-time code designs with a new design criterion that achieve full spatial diversity when linear receivers such as MMSE and ZF receivers are used, and algebraic space-time code designs that achieve the full cooperative diversity in cooperative communications systems when synchronization between relay nodes does not hold, and also space-time codes for cooperative systems that are robust to both timing errors and frequency offsets.
DTIC
Algebra; Broadband; Coding; Number Theory; Wireless Communication

20080041869 Naval War Coll., Newport, RI USA
Afghanistan: Are We Doing What We Need To Do To Win?
Loschinskey, J J; Apr 23, 2008; 25 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484295; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The international community, as a whole, works to ensure that Afghanistan is no longer a safe haven for extremists and terrorist organizations. Capable and sustainable governance of Afghanistan by Afghans is the common agreed upon end state, but also serves as the last common benchmark guiding efforts for U.S. and NATO forces. This paper will analyze the approach to reconstruction and development (R&D) in Afghanistan from an operational perspective. R&D, as opposed to the U.S. term Stability and Reconstruction (S&R), will be used in this analysis as it may be more appropriate considering NATO's stated objective of 'helping the government of Afghanistan extend its authority,' rather than simply secure and rebuild. The thesis is that NATO is currently not acting in an effective manner from a theater strategic and operational perspective to meet theater strategic and operational objectives. This paper will address the operational environment, the plan guiding R&D, U.S. and ISAF operations, then discuss an alternative perspective on what needs to happen in Afghanistan to achieve unity of effort in reconstruction and development operations and close with some recommendations on practical application of changes.
DTIC
Afghanistan; Stability

20080041904 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA

Following the Reaction of Chemical Warfare Agents on Adsorbents by Transmission Fourier Infrared Spectrometry

Lochner, J M; Bartram, Philip W; Jul 1, 2003; 10 pp.; In English; Original contains color illustrations

Report No.(s): AD-A484397; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The reactions of HD, VX, and GD on metal oxides and core-shell metal oxides were followed by transmission FTIR. The decomposition was determined by the decrease in characteristic absorption peaks noted for each agent. The increase in the characteristic absorption peaks for hydrolysis products was also used to verify the reactions. Typical absorbance bands for agent and major hydrolysis product were as follows: GD (1320 cm-1) and PMPA (1189 cm-1), HD (1295 /cm and 1212 /cm) and TDG (1059 /cm), VX (1299 /cm) and EMPA (1315 /cm). Two different samples of aerogel prepared magnesium oxide (AP-MgO) demonstrated significant GD reactivity over 20 hours at room temperature. Little or no agent decomposition occurred on the other adsorbents. The work supported the Destructive Adsorption program.

DTIC

Adsorbents; Chemical Warfare; Fourier Analysis; Infrared Spectrometers; Infrared Spectroscopy

70
PHYSICS (GENERAL)

Includes general research topics related to mechanics, kinetics, magnetism, and electrodynamics. For specific areas of physics see *categories 71 through 77*. For related instrumentation see *35 Instrumentation and Photography*; for geophysics, astrophysics, or solar physics see *46 Geophysics, 90 Astrophysics*, or *92 Solar Physics*.

20080040822 Stanford Linear Accelerator Center, CA, USA; Bari Univ., Italy; Istituto Nazionale di Fisica Nucleare, Florence, Italy

Dalitz Plot Analysis of D0 to Anti-K0 K+ K- And D/SJ States at BaBar

Pappagallo, M.; Oct. 2007; 5 pp.; In English

Contract(s)/Grant(s): DE-AC02-76SF00515

Report No.(s): DE2007-918046; SLAC-PUB-12885; No Copyright; Avail.: National Technical Information Service (NTIS)

Although the BaBar project is mostly known as a B meson factory there is much more than B physics which can be done at this facility. The copious production of cc pairs from the continuum and high integrated luminosity, makes BaBar an excellent laboratory where to study the charm production and decays.

NTIS

Particle Decay; Particle Production

20080040824 Iowa Univ., Iowa City, IA, USA

Recent Results on Charm and Tau Physics from BABAR and Belle

Salvatore, F.; January 2007; 22 pp.; In English

Contract(s)/Grant(s): DE-AC02-76SF00515

Report No.(s): DE2007-918042; SLAC-PUB-12884; No Copyright; Avail.: National Technical Information Service (NTIS)

No abstract available

Charm (Particle Physics); Leptons

20080040825 Stanford Univ., Stanford, CA USA

Alpha and Beta at the B Factories

Finocchiaro, G.; January 2007; 14 pp.; In English

Contract(s)/Grant(s): DE-AC02-76SF00515

Report No.(s): DE2007-918040; SLAC-PUB-12886; No Copyright; Avail.: National Technical Information Service (NTIS)

We review recent experimental results on time-dependent CP asymmetries in the B system from the BABAR and Belle experiments. Measurements of the a and a angles of the Unitarity Triangle of the CKM matrix are discussed. These measurements constitute stringent tests of the Standard Model, and are also used to search for new physics.

NTIS

Industrial Plants; Time Dependence

20080040826 Iowa Univ., Iowa City, IA, USA
Hyperon and Hyperon Resonance Properties From Charm Baryon Decays at BABAR
Ziegler, V.; January 2007; 7 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-918039; SLAC-PUB-12887; No Copyright; Avail.: National Technical Information Service (NTIS)
The data samples used for the analyses described in this note were collected with the BABAR detector at the PEP-II asymmetric-energy e+e- collider. In these studies the charm baryons are inclusively produced in e+e- collisions at center-of-mass energies 10.58 and 10.54 GeV. The BABAR detector and reconstruction software are described elsewhere.
NTIS
Baryons; Charm (Particle Physics); Hyperons

20080040828 California Univ., Santa Barbara, CA, USA
Study of Exclusive Semileptonic B Meson Decays to Tau Leptons
Mazur, M. A.; Sep. 2007; 359 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-918028; SLAC-R-882; Copyright; Avail.: National Technical Information Service (NTIS)
No abstract available
Leptons; Mesons; Particle Decay

20080040829 Stanford Univ., Stanford, CA USA
Study of Double-Charm and Charm-Strange Baryons in Electron-Positron Annihilations
Edwards, A. J.; January 2007; 161 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-918027; SLAC-R-883; Copyright; Avail.: National Technical Information Service (NTIS)
In this dissertation this author describes a study of both double-charm and charm-strange baryons produced from positron-electron (e+e) annihilations in the BABAR Detector at the Stanford Linear Accelerator Center (SLAC). This study is motivated by my desire to investigate new particles and to test theoretical models of particle physics. Our understanding of the production and decay of baryons is based on the Standard Model of elementary particle physics. As part of the Standard Model, quantum chromodynamics (QCD) provides a framework for predicting what types of quark states can form, and their production and strong decay rates. QCD does not lead to exact calculations, but models are developed to approximate its effects and and to make theoretical predictions. Measurements of particle masses, production rates, decay rates, and decay modes can be compared to theoretical predictions. These comparisons can be used to identify the quantum states of observed baryons. Such comparisons can also be used to evaluate the validity of different theoretical models. Finding new states and new decay modes, and measuring production and strong-decay rates provides tests of phenomenological models of quark interactions in QCD.
NTIS
Annihilation Reactions; Baryons; Charm (Particle Physics); Electrons; Elementary Particle Interactions; Positrons

20080040830 Stanford Univ., Stanford, CA USA; Dortmund Univ., Germany
Hadronic Final States in e(sup +)e(sup -) Anninilation at BABAR
Oct. 2007; 4 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-918026; SLAC-PUB-12844; No Copyright; Avail.: Department of Energy Information Bridge
The high performance of the BABAR detector and the PEP-II machine required by the primary goal of the experiment, the study of CP violation in the b sector, makes BABAR an excellent place to study hadronic final states in e(sup +)e(sup -) annihilation. Of special importance are the particle identification capabilities that make it possible to cleanly study many different final states. With the method of radiative return it is possible to not only study events at the center-of-mass energy of the collider but also at low energy down to the threshold.
NTIS
Annihilation Reactions; Hadrons

20080040831 Florida State Univ., Tallahassee, FL, USA
Search for Gluonic Excitations in Light Unconventional Mesons. Proceedings of Science
Eugenio, P.; January 2007; 14 pp.; In English
Report No.(s): DE2007-917350; Copyright; Avail.: National Technical Information Service (NTIS)

Studies of meson spectra via strong decays provide insight regarding QCD at the confinement scale. These studies have led to phenomenological models for QCD such as the constituent quark model. However, QCD allows for a much richer spectrum of meson states which include extra states such as exotics, hybrids, multi-quarks, and glueballs. First discussion of the status of exotic meson searches is given followed by a discussion of plans at Jefferson Lab to double the energy of the machine to 12 GeV, which will allow us to access photoproduction of mesons in search for gluonic excited states.
NTIS
Conferences; Excitation; Mesons

20080040832 Stanford Linear Accelerator Center, CA, USA; Centre National de la Recherche Scientifique, Paris, France
Measurement of the CKM Angle Gamma at Babar (October 2007)
Latour, E.; Oct. 2007; 3 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-917277; SLAC-PUB-12848; No Copyright; Avail.: National Technical Information Service (NTIS)

No abstract available
Measurement; Angles (Geometry)

20080040834 Stanford Linear Accelerator Center, CA, USA; Argonne National Lab., IL USA
Collimation Optimizations, Capture Efficiency, and Primary-beam Power Loss in the ILC Positron Source Transport
Zhou, F.; Nosochkov, Y.; Sheppard, J. C.; Liu, W.; Sep. 2007; 10 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-917271; SLAC-PUB-12798; No Copyright; Avail.: National Technical Information Service (NTIS)

The ILC positron beam generated from a thin Ti target has a wide energy spread and large transverse divergence. With the collection optics immediately downstream of the target and pre-acceleration to 125 MeV, the collected positron beam still has a long tail of positrons with low energies and large transverse divergence, which will be lost in the rest of the ILC positron source beamline. A collimation system is proposed and optimized for the case of a shielded target with quarter-wave transformation collection optics so that the power loss in the magnets and RF structures is effectively controlled within the acceptable level and in the damping ring (DR) within 640 W, assuming 3OE1010 of the captured positrons per bunch in the DR. In this case, the capture efficiency and DR injection efficiency are 13% and 99.8%, respectively. The lower capture efficiency is expected to result in higher injection efficiency and therefore, a lower power loss in the DR. The capture efficiency for the cases of a shielded target with flux concentrator and 5- T immersed target with flux concentrator is 20% and 30%, respectively, with the collimation system.
NTIS
Collimation; Collimators; Optimization; Particle Accelerators; Positrons

20080040843 Wisconsin Univ., Madison, WI, USA
Investigation of the Richtmyer-Meshkov Instability Research Funded under the Stewardship Science Academic Alliances Program (Technical Report, April 2006-April 2007)
Bonazza, R.; Anderson, M.; Oakley, J.; Mar. 2007; 2 pp.; In English
Contract(s)/Grant(s): DE-FG52-06NA26196
Report No.(s): DE2007-901009; DOE/NA-26196-1; No Copyright; Avail.: Department of Energy Information Bridge

The present research program is centered on the experimental and numerical study of the hydrodynamics of shock-accelerated spherical density inhomogeneities. These flows are part of a broader category of shock-induced mixing flows that play a critical role in the implosion of D-T pellets in laser-driven ICF experiments. For the past year, our work has consisted of both experimental and numerical activities which were presented at two conferences and resulted in the publication of one journal article and the submission of a second one. The papers from one of the conferences are included here.
NTIS
Hydrodynamics; Magnetohydrodynamic Stability

20080040852 Lawrence Livermore National Lab., Livermore, CA USA; Cornell Univ., Ithaca, NY, USA; Deutsches Elektronen-Synchrotron, Hamburg, Germany; California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Performance of a Nanometer Resolution BPM System
Walston, S.; Chung, C.; Fitsos, P.; Gronberg, J.; Vogel, V.; Jun. 2006; 4 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-902738; SLAC-PUB-12483; No Copyright; Avail.: National Technical Information Service (NTIS)

International Linear Collider (ILC) interaction region beam sizes and component position stability requirements will be as small as a few nanometers. It is important to the ILC design effort to demonstrate that these tolerances can be achieved-ideally using beam-based stability measurements. It has been estimated that RF cavity beam position monitors (BPMs) could provide position measurement resolutions of less than one nanometer and could form the basis of the desired beam-based stability measurement. We have developed a high resolution RF cavity BPM system. A triplet of these BPMs has been installed in the extraction line of the KEK Accelerator Test Facility (ATF) for testing with its ultra-low emittance beam. The three BPMs are rigidly mounted inside an alignment frame on variablelength struts which allow movement in position and angle. We have developed novel methods for extracting the position and tilt information from the BPM signals including a calibration algorithm which is immune to beam jitter. To date, we have been able to demonstrate a resolution of approximately 20 nm over a dynamic range of +/- 20 microns. We report on the progress of these ongoing tests.
NTIS
Beams (Radiation); Radio Frequencies; Atomic Energy Levels; Dynamic Range

20080040913 Texas State Univ., Austin, TX, USA; Fermi National Accelerator Lab., Batavia, IL, USA
Tevatron Optics Measurements Using an AC Dipole
Miyamoto, R.; Kopp, S. E.; Jansson, A.; Syphers, M. J.; Jun. 2007; 3 pp.; In English
Contract(s)/Grant(s): DE-AC02-07CH11359
Report No.(s): DE2007-915122; FERMILAB-CONF-07-339-AD-APC; No Copyright; Avail.: Department of Energy Information Bridge

The AC dipole is a device to study beam optics of hadron synchrotrons. It can produce sustained large amplitude oscillations with virtually no emittance growth. A vertical AC dipole for the Tevatron is recently implemented and a maximum oscillation amplitude of 2 (4) at 980 GeV (150 GeV) is achieved. When such large oscillations are measured with the BPM system of the Tevatron (20 1m resolution), not only linear but even nonlinear optics can be directly measured. This paper shows how to measure function using an AC dipole and the result is compared to the other measurement. The paper also shows a test to detect optics changes when small changes are made in the Tevatron. Since an AC dipole is nondestructive, it allows frequent measurements of the optics which is necessary for such an test.
NTIS
Alternating Current; Particle Accelerators

20080040914 Technische Univ., Dresden, Germany
Measurement of /V(sub cb)/ and b yields clv Transitions at BABAR
Klose, V.; Oct. 2007; 3 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-918025; SLAC-PUB-12845; No Copyright; Avail.: Department of Energy Information Bridge

Semileptonic (s.l.) B-meson decays B-Xclv provide direct access to the CKM matrix element jVcbj and furthermore probe the structure of B mesons through observables of these decays. Observables of inclusive decays are sensitive to quantities such as the mass and momentum distribution of the b quark inside the B meson. These properties can be extracted from ts of predictions calculated in a Heavy Quark Expansion (HQE) to measured inclusive hadronic or is most suitable for the extraction of jVcbj due to its large decay rate and comparably clean experimental environment. Semileptonic decays including leptons provide, besides a new source of information on the Standard Model (SM), a window to physics beyond the SM, as this decay can be mediated by a charged Higgs boson.
NTIS
Mesons; Particle Decay

20080040915 Stanford Linear Accelerator Center, Menlo Park, CA, USA; California Univ., Los Angeles, CA, USA
Steady State Analysis of Short-Wavelength, High-gain FLEs in a Large Storage Ring
Huang, Z.; Cai, Y.; Chao, A.; Hettel, R.; Pellegrini, C.; Oct. 2007; 8 pp.; In English
Report No.(s): DE2007-918019; SLAC-PUB-12858; No Copyright; Avail.: National Technical Information Service (NTIS)

Storage ring FELs have operated successfully in the low-gain regime using optical cavities. Discussions of a high-gain

FEL in a storage ring typically involve a special bypass to decouple the FEL interaction from the storage ring dynamics. In this paper, we investigate the coupled dynamics of a high-gain FEL in a large storage ring such as PEP and analyze the equilibrium solution. We show that an FEL in the EUV and soft x-ray regimes can be integrated into a very bright storage ring and potentially provides three orders of magnitude improvement in the average brightness at these radiation wavelengths. We also discuss possibilities of seeding with HHG sources to obtain ultra-short, high-peak power EUV and soft x-ray pulses.
NTIS
Free Electron Lasers; High Gain; Steady State; Storage Rings (Particle Accelerators)

20080040916 Stanford Linear Accelerator Center, Menlo Park, CA, USA; Universidad Complutense, Madrid, Spain; Indiana Univ., Bloomington, IN, USA
Illuminating the 1/chi Moment of Parton Distribution Functions
Brodsky, S. J.; Llanes-Estrada, F. J.; Szczepaniak, A. P.; Oct. 2007; 11 pp.; In English
Report No.(s): DE2007-918020; SLAC-PUB-12857; No Copyright; Avail.: National Technical Information Service (NTIS)
The Weisberger relation, an exact statement of the parton model, elegantly relates a high-energy physics observable, the 1/x moment of parton distribution functions, to a nonperturbative low-energy observable: the dependence of the nucleon mass on the value of the quark mass or its corresponding quark condensate. We show that contemporary fits to nucleon structure functions fail to determine this 1/x moment; however, deeply virtual Compton scattering can be described in terms of a novel F1/x(t) form factor which illuminates this physics. An analysis of exclusive photon-induced processes in terms of the parton-nucleon scattering amplitude with Regge behavior reveals a failure of the high Q2 factorization of exclusive processes at low t in terms of the Generalized Parton-Distribution Functions which has been widely believed to hold in the past. We emphasize the need for more data for the DVCS process at large t in future or upgraded facilities.
NTIS
Distribution Functions; Illuminating; Moment Distribution; Partons

20080040917 Stanford Linear Accelerator Center, Menlo Park, CA, USA; Brookhaven National Lab., Upton, NY USA
14 mrad Extraction Line Optics for Push-Pull
Nosochkov, Y.; Moffeit, K.; Seryi, A.; Morse, W.; Parker, B.; Oct. 2007; 6 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-918021; SLAC-PUB-12856; No Copyright; Avail.: National Technical Information Service (NTIS)
The ILC design is based on a single Interaction Region (IR) with 14 mrad crossing angle and two detectors in the 'push-pull' configuration, where the detectors can alternately occupy the Interaction Point (IP). Consequently, the IR optics must be compatible with different size detectors designed for different distance L* between the IP and the nearest quadrupole. This paper presents the push-pull optics for the ILC extraction line compatible with L* = 3.5 m to 4.5 m, and the simulation results of extraction beam loss at 500 GeV CM with detector solenoid.
NTIS
Crossings; Extraction; Optics

20080041116 Lowell Univ., MA USA
Submillimeter Wavelength Modeling of Dielectric Materials in Polarimetric Radar Approaches
Giles, R H; Ferdinand, A P; Coulombe, M J; Waldman, J; Nixon, W; Reinhold, W; Sep 1988; 10 pp.; In English
Report No.(s): AD-A483260; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483260
Development of two measurement techniques has made polarimetric study of dielectric materials at submillimeter wavelengths possible. The first technique, a linearly polarized(LP) transmit/receive measurement system probes polarimetric behavior of a dielectric material through observation of the material's Brewster angle. The second technique, utilizes the recently developed submillimeter quarter wave plate(QWP) to perform ellipsometric determination of the dielectric material's complex refractive index. In this paper submillimeter wavelength measurement techniques are used to polarimetrically characterize a variety of dielectric materials and demonstrate the feasibility of modeling clutter at microwave and millimeter wavelengths.
DTIC
Dielectrics; Polarimetry; Radar; Submillimeter Waves

20080041156

Co-channel Interference Mitigation for Robust Coexistence of Frequency Hopped Networks

Liu, Xiangqian; Sep 30, 2006; 35 pp.; In English

Contract(s)/Grant(s): W911NF-05-1-0485

Report No.(s): AD-A483366; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483366

To meet the military's increased need for rapidly deployable communication solutions, wireless networks are becoming increasingly common within tactical environments. Frequency hopping (FH) is widely used for radio transmission in such networks due to its low probability of detection/interception. With the increasing deployment, multiple networks occupying overlapping frequency bands are likely to coexist in a physical environment, especially in tactical operations, emergency situations, or dense-populated areas. Consequently co-channel interference due to frequency collisions can become a major performance limiting factor. In this project, we developed a novel interference mitigation technique based on multidimensional frequency estimation coupled with the expectation-maximization principle, which effectively resolves collisions among non-collaborative networks, thus enabling robust coexistence of multiple FH networks. To deal with possible receiver-transmitter mismatch, we also designed a low-complexity model order variation detection method. Novel multidimensional frequency estimation algorithms are also investigated.

DTIC

Communication Networks; Electromagnetic Interference; Frequencies; Frequency Hopping

20080041176 Maryland Univ., College Park, MD USA

A Dendritic Model of Coincidence Detection in the Avian Brainstem

Simon, Jonathan Z; Carr, Catherine E; Shamma, Shihab A; Jan 1998; 25 pp.; In English

Contract(s)/Grant(s): N00014-97-1-0501; NSF-9720334

Report No.(s): AD-A483451; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483451

The coincidence detector neurons in the auditory brainstem detect interaural time differences (ITDs). Inspired by a minimal biophysical model [Agmon-Snir et al, Nature 393, 268-272 (1998)], we constructed a model using the NEURON environment. ITD coding was improved when the inputs from both ears were located on the bipolar dendrites and segregated over having both inputs on the soma. Thus the model behaves both like the in vivo coincidence detectors and the minimal model. The model has enabled us to explore features of the coincidence detector neurons unexplained by the simple biophysical model, including the effect of synapse location and multiple dendrites.

DTIC

Biophysics; Birds; Detectors; Models; Neurons; Rangefinding

20080041268 Naval Postgraduate School, Monterey, CA USA

Performance Analysis of an Alternative to Trellis Coded Modulation for Waveforms Transmitted over a Channel with Pulse-Noise Interference

Monteiro Marques, Mario R; Jun 2008; 59 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483506; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The performance of a communication system having almost the same spectral efficiency as a trellis coded modulation (TCM) system with r = 2/3 convolutional encoding and 8-ary phase-shift keying (8-PSK) modulation is investigated. TCM is a common solution to the problem of adding forward error correction (FEC) coding without an attendant increase in channel bandwidth. The primary drawback to TCM is that the achievable coding gain is limited by the maximum practical number of states in the convolutional encoder. The alternative system considered uses (63, 37) Reed-Solomon (RS) encoding. The six-bit symbols at the output of the Reed-Solomon encoder undergo serial-to-parallel conversion to two three-bit symbols, which are then independently transmitted on the in-phase (I) and quadrature (Q) component of the carrier using 8-ary biorthogonal keying (8-BOK). This system has a null-to-null bandwidth of 0.993Rb, which is 0.7% smaller than TCM with r = 2/3 convolutional encoding and 8-PSK modulation. The two waveforms are compared for the relatively benign case where additive white Gaussian noise (AWGN) is the only noise present as well as when pulse-noise interference (PNI) is present. It was found that both systems have almost the same performance in AWGN, but with PNI the alternative system has better performance.

DTIC

Coding; Modulation; Reliability Analysis; Waveforms

20080041332 Naval Postgraduate School, Monterey, CA USA

Terrestrial Communication Between Wireless Sensor Networks Using Beam-Forming and Space Division Multiple Access

Taylor, Chris E; Jun 2008; 117 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483656; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In this thesis, methods for forming a communications link of Wireless Sensor Networks (WSN) by enabling each WSN to act as a smart antenna are presented. Each WSN is simulated as a set of randomly placed sensor nodes within a planar area. The proposed method involves a searching WSN, a receiving WSN and a link budget for establishing the link. The searching WSN has the task of transmitting a search beam in order to find adjacent WSNs. Like a lighthouse this is done in a rotating beam style search using the sensor nodes as an aperiodic array. Results show that for a random array, we can achieve a specific beamwidth and gain as a function of the number of elements and area. We also demonstrate that for a given required gain level we can spatially thin the array without significant loss of gain or the effects of grating lobes. The receiving WSN uses a spread spectrum based space division multiple access (SDMA) receiver. This receiver is simulated to determine the direction of arrival from the searching WSN and to extract the location information from the searching WSN's signal with additive white Gaussian noise. From the DOA and the location information within the arriving signal, the WSN has sufficient knowledge to respond to the query of the searching WSN and form the communications link.

DTIC

Communication Networks; Multiple Access; Networks; Spread Spectrum Transmission; Wireless Communication

20080041344 Naval Research Lab., Washington, DC USA

Electron and Nuclear Spin Interactions in the Optical Spectra of Single GaAs Quantum Dots

Gammon, D; Efros, Al L; Kennedy, T A; Rosen, M; Katzer, D S; Park, D; Brown, S W; Korenev, V L; Merkulov, I A; May 28, 2001; 5 pp.; In English

Report No.(s): AD-A483718; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Fine and hyperfine splittings arising from electron, hole, and nuclear spin interactions in the magnetooptical spectra of individual localized excitons are studied. We explain the magnetic field dependence of the energy splitting through competition between Zeeman, exchange, and hyperfine interactions. An unexpectedly small hyperfine contribution to the splitting close to zero applied field is described well by the interplay between fluctuations of the hyperfine field experienced by the nuclear spin and nuclear dipole/dipole interactions.

DTIC

Electron Spin; Gallium Arsenides; Magnetic Fields; Nuclear Spin; Photoluminescence; Quantum Dots; Spectra

20080041358 Naval Postgraduate School, Monterey, CA USA

Experimental Investigation of High-Pressure Steam-Induced Surge in a Transonic Compressor Stage

Hurley, Andrew M; Jun 2008; 65 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483762; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Operational experience indicates that steam escaping from carrier catapults has the potential to induce stall or surge in the compressors of jet aircraft during takeoff. As the carrier fleet ages and the Navy transitions to the single engine F-35C variant of the Joint Strike Fighter, further investigation of steaminduced surge phenomena is necessary to avert undue risks to pilots and to obviate stall related damage to Navy aircraft. This study investigated the effects of both throttle-induced surge and steam-induced surge in a transonic compressor stage at 70%, 80%, 90%, 95%, and 100% of the compressor design speed. The primary goals of this research were to quantify changes in the compressor stall margin as a result of steam ingestion and to develop pressure contour maps to analyze the transformation of shock structures in the blade passages as they relate to inlet throttle settings. The results of this experiment confirmed that the introduction of high-pressure steam consistently reduced the observed compressor stall margin over the entire operating range of the transonic stage and produced reliable representations of the shock structure present along the compressor casing.

DTIC

Compressors; High Pressure; Steam; Surges; Transonic Compressors

20080041457 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA; Rice Univ., Houston, TX USA

Derivative-free Optimization Methods for Surface Structure Determination of Nanosystems

Meza, J. C.; Garcia-Lekue, A.; Aramsom, M. A.; Dennis, J. E.; Oct. 19, 2007; 4 pp.; In English

Report No.(s): DE2007-918503; No Copyright; Avail.: Department of Energy Information Bridge

Many properties of nanostructures depend on the atomic configuration at the surface. One common technique used for

determining this surface structure is based on the low energy electron diffraction (LEED) method, which uses a high-fidelity physics model to compare experimental results with spectra computed via a computer simulation. While this approach is highly effective, the computational cost of the simulations can be prohibitive for large systems. In this work, we propose the use of a direct search method in conjunction with an additive surrogate. This surrogate is constructed from a combination of a simplified physics model and an interpolation that is based on the differences between the simplified physics model and the full fidelity model.
NTIS
Computerized Simulation; Derivation; Electron Diffraction; Surface Properties

20080041461 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA; Lawrence Livermore National Lab., Livermore, CA USA
Simulation and Beam Line Experiments for the Superconducting ECR Ion Source VENUS
Todd, D. S.; Leitner, D.; Lyneis, C. M.; Aug. 2007; 12 pp.; In English
Report No.(s): DE2007-918501; LBNL-63500; No Copyright; Avail.: Department of Energy Information Bridge
The particle-in-cell code Warp has been enhanced to incorporate both two- and three-dimensional sheath extraction models giving Warp the capability of simulating entire ion beam transport systems including the extraction of beams from plasma sources. In this article we describe a method of producing initial ion distributions for plasma extraction simulations in electron cyclotron resonance (ECR) ion sources based on experimentally measured sputtering on the source biased disc. Using this initialization method, we present preliminary results for extraction and transport simulations of an oxygen beam and compare them with experimental beam imaging on a quartz viewing plate for the superconducting ECR ion source VENUS.
NTIS
Cyclotron Resonance; Ion Beams; Ion Sources; Plasmas (Physics); Simulation; Superconductivity

20080041463 Brookhaven National Lab., Upton, NY USA
EPICS SCA Clients on the .NET X64 Platform
Timossi, C.; Nishimura, H.; January 2007; 2 pp.; In English
Report No.(s): DE2007-918491; DE-AC03-76SF00098; No Copyright; Avail.: Department of Energy Information Bridge
We have developed a .NET assembly, which we call SCA.NET, which we have been using for building EPICS based control room applications at the Advanced Light Source (ALS). In this paper we report on our experiences building a 64-bit version of SCA.NET and the underlying channel access libraries for Windows XP x64 (using a dual core AMD Athlon CPU). We also report on our progress in building new accelerator control applications for this environment.
NTIS
Computer Programs; Ground Based Control; Integrated Mission Control Center

20080041693 Washington State Univ., Pullman, WA USA
Novel High Frequency Signatures for Classification/Identification
Marston, Philip L; Jun 2008; 19 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-03-1-0583
Report No.(s): AD-A483966; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483966
The emphasis of the research summarized here concerns the production of enhancements in the scattering of high frequency sound by various penetrable cylinders. Examples of such cylinders in water include solid polymer (plastic) cylinders having flat or curved ends, plastic cylindrical shells containing a liquid having a low speed of sound, and a solid fiberglass cylinder. In some cases the cylinders were encased in stainless steel or fiberglass. In most cases studied the enhancements are associated with waves transmitted through the material within the cylinder and reflected off of the curved back wall of the cylinder. Various imaging methods are demonstrated including bistatic synthetic aperture sonar (SAS) and supersonic acoustic holography. The holographic and SAS images clearly indicate that contrary to an opinion held by some researchers, it is possible to have image features associated with waves transmitted within the objects being viewed which are much brighter than image features associated with external specular reflection or edge diffraction by the object. Some related research is described concerning the scattering by a partially exposed cylinder.
DTIC
Acoustics; Classifications; High Frequencies; Signatures

20080041714 Naval Research Lab., Washington, DC USA

Dynamical Formation and Stability of Helical Prominence Magnetic Fields

DeVore, C R; Antiochos, Spiro K; Jan 2000; 32 pp.; In English

Report No.(s): AD-A484059; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA484059

We numerically simulated an initially bipolar magnetic field subjected to shear motions concentrated near and parallel to the photospheric polarity inversion line. The simulations yield three principal results: (1) For footprint displacements comparable to the bipole's depth, the sheared core field acquires a dipped geometry that can support cool prominence material against gravity. This confirms previous force-free equilibrium models for forming dipped prominence fields by differential shear, and extends them to much larger applied shears and time-dependent dynamics with dissipation. (2) At larger shears, we discover a new mechanism for forming the helical magnetic fields of prominences. It entails a two-step process of magnetic reconnection in the corona. First, flux in the sheared core reconnects with flux in the unsheared, restraining arcade, producing new pairs of interlinked field lines. Second, as these interlinked fields continue to be sheared, they are brought together and reconnect again, producing helical field threading and enveloping the body of the prominence. This mechanism can account for the twist that is often observed in both quiescent and erupting prominences. (3) Even for very large shears, the dipped, helical structure settles into an apparently stable equilibrium, despite the substantial amount of reconnection and twist in the magnetic field. We conclude that neither a kink instability of the helical core field, nor a tether-cutting instability of the restraining arcade, is operating in our low-lying model prominence. This concurs with both observations and a theoretical model for prominence stability.

DTIC

Magnetic Field Configurations; Magnetic Fields; Stability

20080041716 Naval Research Lab., Washington, DC USA

Magnetic Helicity Generation by Solar Differential Rotation

DeVore, C R; Jan 2000; 36 pp.; In English

Report No.(s): AD-A484061; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA484061

Observations of sunspots, active regions, filaments, coronal arcades, and interplanetary magnetic clouds indicate that the Sun preferentially exhibits left-handed, negative-helicity features in its northern hemisphere, and their opposite counterparts in the south, independent of sunspot cycle. We investigate quantitatively the generation of magnetic helicity by solar differential rotation acting on emerged bipolar sources of flux, using analytical and numerical methods. We find that the vast majority of bipoles absorb negative helicity in the northern hemisphere and positive helicity in the south, in accord with observations. After two to four solar rotation periods have elapsed, the helicity generated by differential rotation amounts to about 10% of the bipole's squared flux. Thus, each of the approximately 1 x 10(3) large bipolar regions emergent on the Sun during sunspot cycle 21 entrained about 1 x 10(43) Mx(2) of helicity in its 1 x 10(22) Mx of flux. We show further that the roughly 5 x 10(3) coronal mass ejections and associated interplanetary magnetic clouds that departed the Sun during the cycle carried off about 5 x 10(24) Mx of flux and 1 x 10(46) Mx(2) of helicity, within a factor of two of the estimates for solar production of these quantities. Evidently, differently rotation acting on emerged bipolar sources of flux can account quantitatively for the magnetic helicity balance of the Sun and the heliosphere, as well as for the observed prevalence of negative-helicity magnetic features in the north and positive-helicity features in the south.

DTIC

Cosmic Rays; Magnetic Fields; Solar Rotation; Solar Wind

20080041887 Naval War Coll., Newport, RI USA

U.S. Military Operations Within the Electromagnetic Spectrum: Operational Critical Weakness

Tornga, Blake; Apr 23, 2008; 25 pp.; In English

Report No.(s): AD-A484326; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Military forces are utterly reliant and irretrievably wed to the electromagnetic spectrum. Unfettered use of the electromagnetic spectrum is a critical requirement in generating and applying combat power in 21st century across all of the warfighting functions. U.S. military operations within the electromagnetic spectrum and the resultant benefit and strength for American forces are in jeopardy. As our demands on the spectrum expand and our enemies' abilities to utilize the spectrum increase, our ability to continue to coordinate activities within the spectrum is growing more and more problematic. Past programs of frequency deconfliction as the primary means for coordination are insufficient in an environment that requires maximum efficiency in the use of the spectrum. Additionally, civilian thirst for spectrum usage has led to portions previously

reserved solely for military operations being auctioned to commercial enterprise. Furthermore, Electronic Warfare (EW) efforts regarding the spectrum are generally uncoordinated either at the tactical or the operational level, and have consequential second and third order effects. Finally, long inattention to EW and frequency management competencies has left forces vulnerable within the electromagnetic battlespace.
DTIC
Electromagnetic Spectra; Military Operations

20080042075 Molecular Imprints, Inc., Austin, TX, USA
Interferometric Analysis Method for the Manufacture of Nano-Scale Devices
Nimmakayala, P. K., Inventor; Rafferty, T. H., Inventor; Aghili, A., Inventor; Choi, B. J., Inventor; Schumaker, P. D., Inventor; 30 Nov 04; 19 pp.; In English
Contract(s)/Grant(s): N66001-01-1-8964; N66001-02-C-8011
Patent Info.: Filed Filed 30 Nov 04; US-Patent-Appl-SN-11-000 321
Report No.(s): PB2008-102509; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention features a method to determine relative spatial parameters between two coordinate systems, which may be a mold and a region of a substrate in which mold is employed to generate a pattern. The method includes sensing relative alignment between the two coordinate systems at multiple points and determines relative spatial parameters therebetween. The relative spatial parameters include a relative area and a relative shape.
NTIS
Interferometry; Patent Applications; Substrates

20080042087 Care'N, LLC, Tracy, CA USA
High Voltage Flux Compression Generators
Chato, Donna M; Chase, Jay B; Kiutu, Gerald F; Apr 2, 2008; 50 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9451-07-M-0088; Proj-3005
Report No.(s): AD-A483740; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483740

Helical magnetic flux compression generators (HFCGs) have been in use for about five decades. There remain limitations to their performance. Recently and for the first time, calculations of high accuracy of HFCG output have been made. The calculated results assume that there are no electrical breakdowns in the generator resulting in a decrease of flux delivered. It has been very difficult to build high performance generators within desired size constraints as a result. The goal of the Phase I effort is to be able to design and build HFCGs that can operate at higher voltages than are presently achieved. Reaching this goal has required the development of advanced computational tools that allow the calculation of all the vector components of both the electrostatic and inductive internal electric fields within the generators, and identification and understanding of the primary reason, or reasons, for field-induced breakdown. Using the two existing 2D codes, FlexPDE and CALE, calculations were completed on the constant pitch region of a HFCG and the results incorporated into CAGEN. We have achieved our goals: the complete inclusion in the model code CAGEN for predicting the electric fields within an explosively powered helical flux compression generator. We accomplished this task by using purely two-dimensional physics equation solutions from the trademarked code FlexPDE.
DTIC
High Voltages; Magnetic Flux; Voltage Generators

20080042135 Fermi National Accelerator Lab., Batavia, IL, USA
B(s) Properties at the Tevatron
Burdin, S.; Jul. 01, 2007; 6 pp.; In English
Contract(s)/Grant(s): DE-AC02-76CH03000
Report No.(s): DE2007-911831; FERMILAB-CONF-06-545-E; No Copyright; Avail.: National Technical Information Service (NTIS)

Recent results on Bs properties obtained by the CDF and DO collaborations using the data samples collected at the Tevatron Collider in the period 2002 2006 were presented at the Hadron Collider Physics Symposium 2006 (Duke University, Durham). The measurements of Bs mass and width differences are discussed in details. Prospects on measurements of CP violation in Bs system are given.
NTIS
Mesons; Particle Accelerators

20080042136 Michigan Univ. Hospitals, Ann Arbor, MI, USA
Annual Report 2006 for Hydrodynamics and Radiation Hydrodynamics with Astrophysical Applications
Drake, R. P.; Dec. 31, 2006; 31 pp.; In English
Contract(s)/Grant(s): DE-FG52-03NA00064
Report No.(s): DE2007-912634; DOE/FG/00064-7; No Copyright; Avail.: Department of Energy Information Bridge

We report the ongoing work of our group in hydrodynamics and radiation hydrodynamics with astrophysical applications. During the period of the existing grant, we have carried out two types of experiments at the Omega laser. One set of experiments has studied radiatively collapsing shocks, obtaining data using a backlit pinhole with a 100 ps backlighter and beginning to develop the ability to look into the shock tube with optical or x-ray diagnostics. Other experiments have studied the deeply nonlinear development of the Rayleigh-Taylor (RT) instability from complex initial conditions, using dual-axis radiographic data with backlit pinholes and ungated detectors to complete the data set for a Ph.D. student. We lead a team that is developing a proposal for experiments at the National Ignition Facility and are involved in experiments at NIKE and LIL. All these experiments have applications to astrophysics, discussed in the corresponding papers. We assemble the targets for the experiments at Michigan, where we also prepare many of the simple components. We also have several projects underway in our laboratory involving our x-ray source. The above activities, in addition to a variety of data analysis and design projects, provide good experience for graduate and undergraduates students. In the process of doing this research we have built a research group that uses such work to train junior scientists.
NTIS
Astrophysics; Hydrodynamics; Shock Waves

20080042137 National Inst. of Standards and Technology, Gaithersburg, MD USA
ITS-90 Calibration of Radiation Thermometers for RTP Using Wire/Thin-Film Thermocouples on a Wafer
Meyer, C. W.; DeWitt, D. P.; Kreider, K. G.; Lovas, F. J.; Tsai, B. K.; January 2007; 5 pp.; In English
Report No.(s): PB2008-104257; No Copyright; Avail.: CASI: A01, Hardcopy

Light-pipe radiation thermometers (LPRTs) are the sensor system of choice in RTP tools. They can be calibrated against blackbodies with an uncertainty (k=1) less than 0.3 DGC. In an RTP tool, however, account must be made for wafer emissivity and wafer-chamber interreflections, or else temperature measurement uncertainties will be orders of magnitude higher. We have used two complementary approaches for accomplishing this: (1) in situ calibration using high-accuracy wire/thin-film thermocouples calibrated on the International Temperature Scale of 1990 (ITS-90) and (2) developing optical models to estimate the effective emissivity of the wafer when used in the radiation environment of the RTP tool. The temperature measurement uncertainty of LPRTs using either technique is 2.1 DGC or less.
NTIS
Calibrating; Pipes (Tubes); Radiation Therapy; Thermometers; Thin Films; Wire

20080042158 Fermi National Accelerator Lab., Batavia, IL, USA
Chromaticity Tracking Using a Phase Modulation Technique
Tan, C. Y.; January 2007; 3 pp.; In English
Report No.(s): DE2007-917092; FERMILAB-CONF-07-195-AD; No Copyright; Avail.: National Technical Information Service (NTIS)

In the classical chromaticity measurement technique, chromaticity is measured by measuring the change in betatron tune as the RF frequency is varied. This paper will describe a novel way of measuring chromaticity: we will phase modulate the RF with a known sine wave and then phase demodulate the betatron frequency. The result is a line in Fourier space which corresponds to the frequency of our sine wave modulation. The peak of this sine wave is proportional to chromaticity. For this technique to work, a tune tracker PLL system is required because it supplies the betatron carrier frequency. This method has been tested in the Tevatron and we will show the results here.
NTIS
Color; Phase Modulation

20080042159 Fermi National Accelerator Lab., Batavia, IL, USA
Normal Zone Propagation in Superconducting Focusing Solenoids and Related Quench Protection Issues
Terechkine, I.; Veretennikov, V.; January 2007; 4 pp.; In English
Report No.(s): DE2007-917091; FERMILAB-CONF-07-426-TD; No Copyright; Avail.: Department of Energy Information Bridge

Superconducting solenoids are increasingly used as focusing lenses in transport channels of proton linear RF accelerators.

If these accelerators employ superconducting RF cavities, each focusing lens is usually comprised of three coils connected in series: a main coil, which provides the needed focusing strength, and two bucking coils, that help to reduce magnetic field outside the lens. When a normal zone develops in any of the coils in a focusing lens, it propagates with a direction and a rate which depends on the coil and the specific part of the coil in which the quench first occurred. As a result of this propagation process (quenching), the temperature and/or voltage of parts of the lens can exceed safe limits, thus compromising lens reliability. On the other hand, the negative impact of quench events can be significantly mitigated if an external resistor is used to absorb a part of the energy stored in the magnetic field. This paper presents the main results of a solenoid quench protection study based on computational modeling of normal zone propagation in solenoid lenses being built for a superconducting linear RF accelerator under development at Fermilab.
NTIS
Protection; Solenoids; Superconductivity

20080042247 Fermi National Accelerator Lab., Batavia, IL, USA
Open Science Grid Status and Architecture
Pordes, R.; Kramer, B.; Petravick, D.; Livny, M.; Avery, P.; January 2007; 10 pp.; In English
Report No.(s): DE2007-917083; FERMILAB-CONF-07-451-CD; No Copyright; Avail.: National Technical Information Service (NTIS)
The Open Science Grid (OSG) provides a distributed facility where the Consortium members provide guaranteed and opportunistic access to shared computing and storage resources. The OSG project(1) is funded by the National Science Foundation and the Department of Energy Scientific Discovery through Advanced Computing program. The OSG project provides specific activities for the operation and evolution of the common infrastructure. The US ATLAS and US CMS collaborations contribute to and depend on OSG as the US infrastructure contributing to the World Wide LHC Computing Grid on which the LHC experiments distribute and analyze their data. Other stakeholders include the STAR RHIC experiment, the Laser Interferometer Gravitational-Wave Observatory (LIGO), the Dark Energy Survey (DES) and several Fermilab Tevatron experiments CDF, D0, MiniBoone etc. The OSG implementation architecture brings a pragmatic approach to enabling vertically integrated community specific distributed systems over a common horizontal set of shared resources and services.
NTIS
Systems Integration; Computer Storage Devices

20080042249 Cairo Univ., Giza, Egypt; Old Dominion Univ., Norfolk, VA, USA
2H(e,e'p)n Reaction at High Four-Momentum Transfer
Ibrahim, H. F.; Dec. 2006; 237 pp.; In English
Report No.(s): DE2007-917020; No Copyright; Avail.: National Technical Information Service (NTIS)
No abstract available
Deuterons; Momentum Transfer

20080042250 Old Dominion Univ., Norfolk, VA, USA; Tel-Aviv Univ., Ramat-Aviv, Tel-Aviv, Israel
Imaging the Proton Via Hard Exclusive Production in Diffractive pp Scattering
Hyde, C. E.; Frankfurt, L.; Strikman, M.; Weiss, C.; Sep. 25, 2007; 6 pp.; In English
Report No.(s): DE2007-917017; No Copyright; Avail.: Department of Energy Information Bridge
We discuss the prospects for probing Generalized Parton Distributions (GPDs) via exclusive production of a high-mass system (H = heavy quarkonium, di-photon, di-jet, Higgs boson) in diffractive pp scattering, pp -> p + H + p. In such processes the interplay of hard and soft interactions gives rise to a diffraction pattern in the final-state proton transverse momenta, which is sensitive to the transverse spatial distribution of partons in the colliding protons. We comment on the plans for diffractive pp measurements at RHIC and LHC. Such studies could complement future measurements of GPDs in hard exclusive ep scattering (JLab, COMPASS, EIC).
NTIS
Imaging Techniques; Partons; Protons; Scattering

20080042251 South Carolina Univ., Columbia, SC, USA
Search for Proton Medium Modifications in the 4He(e,e'p)3H Reaction
Strauch, S.; Sep. 2007; 6 pp.; In English
Report No.(s): DE2007-917016; DOE/OR/23177-0153; No Copyright; Avail.: National Technical Information Service (NTIS)
Polarization transfer in quasi-elastic nucleon knockout is sensitive to the properties of the nucleon in the nuclear medium,

including possible modification of the nucleon form factor and/or spinor. In our recently completed experiment E03-104 at Jefferson Lab we measured the proton recoil polarization in the 4He(e,e'p)3H reaction at a Q(caret)2 of 0.8 (GeV/c)(caret)2 and 1.3 (GeV/c)(caret)2 with unprecedented precision. These data complement earlier data between 0.4 and 2.6 (GeV/c)(caret)2 from both Mainz and Jefferson Lab. The measured ratio of polarization-transfer coefficients differs from a fully relativistic calculation, favoring either the inclusion of a medium modification of the proton form factors predicted by a quark-meson coupling model or strong charge-exchange final-state interactions. The measured induced polarizations agree well with the fully relativistic calculation and indicate that these strong final-state interactions may not be applicable.
NTIS
Protons; Quark Models

20080042252 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA
Proceedings of Science: Parameter Tuning of Three-Flavor Dynamical Anisotropic Clover Action
Lin, H. W.; Edwards, R. G.; Joo, B.; Aug. 2007; 7 pp.; In English
Report No.(s): DE2007-917015; No Copyright; Avail.: National Technical Information Service (NTIS)
In this work, we perform parameter tuning with dynamical anisotropic clover lattices using the Schrodinger functional and stout-smearing in the fermion field. We find that $/xi(underline)R//xi(underline)0$ is relatively close to 1 in our parameter search, which allows us to fix $/xi(underline)0$ in our runs. We proposed to determine the gauge and fermion anisotropy in a Schrodinger-background small box using Wilson loop ratios and PCAC masses. We demonstrate that these ideas are equivalent to but more efficient than the conventional meson dispersion approach. The spatial and temporal clover coefficients are fixed to the tree-level tadpole-improved clover values, and we demonstrate that they satisfy the nonperturbative condition determined by Schrodinger functional method.
NTIS
Anisotropy; Conferences; Fermions; Quantum Chromodynamics; Tuning

20080042253 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA
Structure Functions at Low Q2: Target Mass Corrections
Melnitchouk, W.; May 2007; 7 pp.; In English
Report No.(s): DE2007-917014; JLAB-THY-07-733; No Copyright; Avail.: Department of Energy Information Bridge
We discuss recent developments in the study of structure functions at low Q(caret)2, focusing in particular on the issue of target mass corrections (TMC) to nucleon structure functions. We summarize the standard TMC implementation, and contrast this with a new formulation which has the correct kinematic threshold behavior at finite Q(caret)2 in the x -> 1 limit.
NTIS
Correction; Mass; Targets

20080042254 Liverpool Univ., UK
CP Violation in b to s Penguins at the B Factories
Payne, D.; Sep. 2007; 4 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-916991; SLAC-PUB-12837; No Copyright; Avail.: Department of Energy Information Bridge
No abstract available
CP Violation; Industrial Plants; Invariance; Mesons

20080042255 Stanford Linear Accelerator Center, CA, USA
Interaction Region Issues at the NLC
Markiewicz, T. W.; Maruyama, T.; Sep. 2007; 7 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-916988; SLAC-PUB-12831; No Copyright; Avail.: National Technical Information Service (NTIS)
Two detector concepts are being investigated for the Next Linear Collider. This paper discusses the current design of the interaction region for one of them, based on a 6 Tesla solenoid and silicon based tracking. Topics include masking layout, backgrounds and the suppression of final quadrupole jitter. All calculations are based on the TeV design parameters.
NTIS
Design Analysis; Solenoids; Silicon

20080042256 Stanford Linear Accelerator Center, CA, USA; Helsinki Univ., Helsinki, Finland; European Organization for Nuclear Research, Geneva, Switzerland

Validation of Hadronic Models in Geant4

Koi, T.; Wright, D. H.; Folger, G.; Ivantchenko, V.; Sep. 2006; 11 pp.; In English

Contract(s)/Grant(s): DE-AC02-76SF00515

Report No.(s): DE2007-916987; SLAC-PUB-12836; No Copyright; Avail.: National Technical Information Service (NTIS)

Geant4 is a software toolkit for the simulation of the passage of particles through matter. It has abundant hadronic models from thermal neutron interactions to ultra relativistic hadrons. An overview of validations in Geant4 hadronic physics is presented based on thin target measurements. In most cases, good agreement is available between Monte Carlo prediction and experimental data; however, several problems have been detected which require some improvement in the models.

NTIS

Computerized Simulation; Hadrons; Particle Interactions

20080042257 Stanford Linear Accelerator Center, CA, USA

Study of B0 to D(*)0h0 Decay and Measurement ofsin (2beta)

Bomben, M.; Sep. 18, 2007; 168 pp.; In English

Contract(s)/Grant(s): DE-AC02-76SF00515

Report No.(s): DE2007-915361; SLAC-R-863; No Copyright; Avail.: National Technical Information Service (NTIS)

No abstract available

Mesons; Decay

20080042258 Stanford Linear Accelerator Center, CA, USA

Focusing DIRC - The First RICH Detector to Correct the Chromatic Error by Timing, and the Development of a New TOF Detector Concept

Vavra, J.; Benitex, J.; Leith, D. W. G. S.; Mazaheri, G.; Ratcliff, B.; Sep. 01, 2007; 8 pp.; In English

Contract(s)/Grant(s): DE-AC02-76SF00515

Report No.(s): DE2007-915360; SLAC-PUB-12803; No Copyright; Avail.: National Technical Information Service (NTIS)

No abstract available

Color; Errors; Photomultiplier Tubes

20080042259 Fermi National Accelerator Lab., Batavia, IL, USA

Measurement of the Relative fraction of ttbar Events Produced Via Gluon fusion in ppbar Collision at s(1/2) = 1.96 TeV at CDF**

Yamaoka, J.; Oct. 01, 2007; 114 pp.; In English

Contract(s)/Grant(s): DE-AC02-76CH03000

Report No.(s): DE2007-915127; FERMILAB-THESIS-2007-18; No Copyright; Avail.: National Technical Information Service (NTIS)

In this thesis we present a measurement of the relative fraction of tt events produced via gluon-fusion to the total number of tt events. Using the kinematics of the production and decay of the top and antitop quark pair, we trained a Neural Network to discriminate the gluon-fusion events. The Neural Network was then used as a template to fit for the gluon-fusion fraction in data.

NTIS

Collisions; Gluons; Neural Nets

20080042260 Fermi National Accelerator Lab., Batavia, IL, USA

Issue and Experience with Controlling Beam Loss at the Tevatron Collider

Annala, G.; Jul. 01, 2007; 6 pp.; In English

Contract(s)/Grant(s): DE-AC02-76CH03000

Report No.(s): DE2007-915125; FERMILAB-CONF-07-399-AD; No Copyright; Avail.: Department of Energy Information Bridge

Controlling beam loss in the Tevatron collider is of great importance because of the delicate nature of the cryogenic magnet system and the collider detectors. Maximizing the physics potential requires optimized performance as well as

protection of all equipment. The operating history of the Tevatron has significantly influenced the way losses are managed. The development of beam loss management in the Tevatron will be presented.
NTIS
Losses; Particle Acceleration; Particle Accelerators

20080042261 Nevada Univ., Las Vegas, NV, USA; Nevada Univ., Las Vegas, NV, USA
Megagauss Magnetic Field Sensors based on Ag2Te
Mitchell, S.; Johnson, A.; Farley, J. W.; Nov. 30, 2006; 10 pp.; In English
Contract(s)/Grant(s): DE-AC52-06NA25946
Report No.(s): DE2007-914428; DOE/NV/25946-052; No Copyright; Avail.: Department of Energy Information Bridge

This paper details the specific area of research, development, and results of advancing this previously unexplored material for direct applications in measuring megagauss fields. Methodology of depositing, configuring, and packaging the silver chalcogenides in millimeter-size probes consistent to the physical constraints of the pulse power device under investigation are discussed in subsequent sections. All fabrication, material deposition, and stoichiometric characterization of the material were facilitated by resources and expertise of the University of Nevada, Las Vegas.
NTIS
Magnetic Fields; Chalcogenides; Silver

20080042277 Klauber and Jackson, Hackensack, NJ, USA
STBC MIMO-OFDM Peak-To-Average Power Ratio Reduction by Cross-Antenna Rotation and Inversion
Bar-Ness, Y., Inventor; Tan, M., Inventor; Latinovic, Z., Inventor; 16 Dec 04; 8 pp.; In English
Patent Info.: Filed Filed 16 Dec 04; US-Patent-Appl-SN-11-013 934
Report No.(s): PB2008-104008; No Copyright; Avail.: CASI: A02, Hardcopy

A signal scrambling method is provided for peak-to-average power ratio (PAPR) reduction of STBC MIMO-OFDM signals in a MIMO-OFDM system having Y transmit antenna. In general terms the OFDM sequence of symbols in said signal for each transmit antenna is divided into M sub-blocks of equal size and subclockwise rotation and inversions are performed across all transmit antennas to generate (2Y)(sup M) permuted sequence sets from the original OFDM sequence. Based on a predetermined criteria, there is then selected from the resulting sets of OFDM sequences the one with the best PAPR properties for transmission. The predetermined criteria preferably comprises identifying maximums for all (2Y)(sup M) sequence sets, by calculating the largest PAPR value of Y sequences in each set and selecting a set with the minimum maximum for transmission.
NTIS
Inversions; MIMO (Control Systems); Patent Applications; Reception Diversity; Rotation

20080042281 Lawrence Livermore National Lab., Livermore, CA USA; California Univ., Berkeley, CA, USA
Portable Low Energy Neutron Source for High Sensitivity Material Characterization
Rowland, M. S., Inventor; Stoeffl, W., Inventor; Hamm, R. W., Inventor; 11 Oct 05; 21 pp.; In English
Contract(s)/Grant(s): W-7405-ENG-48
Patent Info.: Filed Filed 11 Oct 05; US-Patent-Appl-SN-11-248 377
Report No.(s): PB2008-103929; No Copyright; Avail.: CASI: A03, Hardcopy

A source of low energy neutrons based on a combination of unique technology has resulted in a man-portable package suitable for field use. This source of low energy neutrons produces a forward directed beam to permit local control and it is electrically activated so there is no radiation hazard when it is turned off for transport and relocation.
NTIS
Neutron Sources; Patent Applications; Sensitivity

20080042315 O'Banion and Ritchey, LLP, Sacramento, CA, USA; California Univ., Berkeley, CA, USA
Neutron and Gamma Detector Using an Ionization Chamber with an Integrated Body and Moderator
Ianakiev, K. D., Inventor; Swinhoe, M. T., Inventor; Lestone, J. P., Inventor; 30 Sep 03; 28 pp.; In English
Contract(s)/Grant(s): W-7405-ENG-36
Patent Info.: Filed Filed 30 Sep 03; US-Patent-Appl-SN-10-677 040
Report No.(s): PB2008-103916; No Copyright; Avail.: CASI: A03, Hardcopy

A detector for detecting neutrons and gamma radiation includes a cathode that defines an interior surface and an interior

volume. A conductive neutron-capturing layer is disposed on the interior surface of the cathode and a plastic housing surrounds the cathode. A plastic lid is attached to the housing and encloses the interior volume of the cathode forming an ionization chamber, into the center of which an anode extends from the plastic lid. A working gas is disposed within the ionization chamber and a high biasing voltage is connected to the cathode. Processing electronics are coupled to the anode and process current pulses which are converted into Gaussian pulses, which are either counted as neutrons or integrated as gammas, in response to whether pulse amplitude crosses a neutron threshold. The detector according to the invention may be readily fabricated into single or multilayer detector arrays.
NTIS
Ionization Chambers; Moderators; Neutron Counters; Neutrons; Patent Applications; Radiation Detectors

20080042316 Heslin Rotherberg Farley and Mesiti, PC, Albany, NY, USA
Method and Apparatus for Implement Xanes Analysis
Chen, Z., Inventor; Gibson, W., Inventor; 1 Dec 05; 18 pp.; In English
Contract(s)/Grant(s): NIH-5R44CA088678-03
Patent Info.: Filed Filed 1 Dec 05; US-Patent-Appl-SN-11-291 349
Report No.(s): PB2008-104009; No Copyright; Avail.: CASI: A03, Hardcopy

Compact, low-power-consuming systems and methods for exposing samples to high-energy radiation, for example, for exposing samples to x-rays for implementing x-ray absorption near edge analysis (XANES). The systems and methods include a low-power-consuming radiation source, such as an x-ray tube; one or more tunable crystal optics for directing and varying the energy of the radiation onto a sample under analysis; and a radiation detecting device, such as an x-ray detector, for detecting radiation emitted by the sample. The one or more tunable crystal optics may be doubly-curved crystal optics. The components of the system may be arranged in a collinear fashion. The disclosed systems and methods are particularly applicable to XANES analysis, for example, XANES analysis of the chemical state of chromium or another transition metal in biological processes.
NTIS
Patent Applications; X Ray Absorption

20080042346 National Inst. of Standards and Technology, Gaithersburg, MD, USA
Gold versus Platinum Thermocouples: Performance Data and an ITS-90 Based Reference Function
Burns, G. W.; Strouse, G. F.; Liu, B. M.; Mangum, B. W.; January 2007; 6 pp.; In English
Report No.(s): PB2008-104259; No Copyright; Avail.: CASI: A02, Hardcopy

A reference function giving the thermoelectric voltage as a function of t90 over the range 0 degrees C to 1000 degrees C has been developed for the gold versus platinum (Au/Pt) thermocouple. Six Au/Pt thermocouples fabricated from 0.5 mm diameter wires of the highest purity (99.999+ %) commercially available were compared with platinum resistance thermometers (PRTs) that were calibrated according to the ITS-90. Comparison measurements were made in stirred liquid baths in the range 0 degrees C to 550 degrees C and in a sodium heat pipe furnace from 545 degrees C up to 1000 degrees C. The thermoelectric voltages of the thermocouples were also determined at the freezing points of indium, tin, cadmium, zinc, aluminum, and silver. The repeatability of the thermocouples was established through repetitive measurements against PRTs and at the fixed points. The thermoelectric homogeneity of the thermocouples was assessed by determining their immersion characteristics in freezing-point cells. The stability of Au/Pt thermocouples with prolonged heating at the silver point (961.78 degrees C) and after rapid thermal cycling between the silver point and room temperature is reported also.
NTIS
Gold; Platinum; Resistance Thermometers; Thermocouples; Thermoelectricity

20080042349 Evan Law Group, LLC, Chicago, IL, USA
Optical Contrast Agents for Optically Modifying Incident Radiation (Corrected Publication)
Boppart, S. A., Inventor; Marks, D. L., Inventor; Suslick, K. S., Inventor; Toublan, F. J. J., Inventor; 17 Jun 03; 19 pp.; In English
Contract(s)/Grant(s): NSF-BES-0086696
Patent Info.: Filed Filed 17 Jun 03; US-Patent-Appl-SN-10-463 835
Report No.(s): PB2008-104020; No Copyright; Avail.: CASI: A03, Hardcopy

A method of enhancing the contrast of an image of a sample, comprises forming an image of a mixture, by exposing the

mixture to electromagnetic radiation. The mixture comprises the sample and microparticles. The enhancement is particularly suitable for optical coherence tomography.
NTIS
Incident Radiation; Patent Applications; Tomography

20080042354 Gifford, Krass, Groh, Sprinkle, and Citkowski, PC, Troy, MI, USA; Pennsylvania State Univ., University Park, PA, USA
Thermoacoustic Piezoelectric Generator (PAT-APPL-10-810 907)
Keolian, R. M., Inventor; Bastyr, K. J., Inventor; 26 Mar 04; 38 pp.; In English
Contract(s)/Grant(s): ONR-N00014-98-1-0212; ONR-N00014-03-0652
Patent Info.: Filed Filed 26 Mar 04; US-Patent-Appl-SN-10-810 907
Report No.(s): PB2008-103985; No Copyright; Avail.: CASI: A03, Hardcopy

A thermoacoustic generator includes a housing with a thermoacoustic core supported in the housing. The core is operable to introduce acoustical power into the housing to thereby oscillate the pressure of the gas in the housing at a frequency. A piezoelectric alternator is also supported in the housing and has a face that is movable when acted on by the acoustical power. The alternator includes a portion of piezoelectric material operable to produce electrical power when acted upon by a stress. The piezoelectric material is in mechanical communication with the movable face so that movement of the face stresses the piezoelectric material. The alternator has a moving mass that serves as a substantial portion of the resonating mass inside the housing, thereby providing a pressure oscillation frequency in the housing substantially lower than for a similar system with a rigid member replacing the alternator.
NTIS
Electric Generators; Patent Applications; Piezoelectricity; Thermoacoustic Effects

20080042356 Colburn (Cantor), LLP, Bloomfield, CT, USA; General Electric Co., Schenectady, NY, USA
Parallel Wound Superconducting Coils for a Synchronous
Laskaris, E. T., Inventor; Fogarty, J. M., Inventor; Huang, X., Inventor; Bray, J. W., Inventor; 7 Dec 04; 14 pp.; In English
Contract(s)/Grant(s): DE-FC36-02GO11100
Patent Info.: Filed Filed 7 Dec 04; US-Patent-Appl-SN-10-904 952
Report No.(s): PB2008-103983; No Copyright; Avail.: CASI: A03, Hardcopy

A superconducting coil assembly includes a plurality of circuit branches. Each circuit branch of the plurality of circuit branches is electrically connected in parallel to each other. Each circuit branch is disposed at a structural core. Each circuit branch of the plurality of circuit branches includes a coil wound from a superconducting wire and a resistive means electrically connected in series to the coil. The coil from each circuit branch forms a plurality of coils with respect to the plurality of circuit branches.
NTIS
Patent Applications; Superconductivity

20080042358 Los Alamos National Lab., NM USA
Multifunctional Nanocrystals
Klimov, V. I., Inventor; Hollingsworth, J. A., Inventor; Crooker, S. A., Inventor; Kim, H., Inventor; 3 Dec 04; 12 pp.; In English
Contract(s)/Grant(s): DE-7405-W-ENG-36
Patent Info.: Filed Filed 3 Dec 04; US-Patent-Appl-SN-11-004 167
Report No.(s): PB2008-103982; No Copyright; Avail.: CASI: A03, Hardcopy

Multifunctional nanocomposites are provided including a core of either a magnetic material or an inorganic semiconductor, and, a shell of either a magnetic material or an inorganic semiconductor, wherein the core and the shell are of differing materials, such multifunctional nanocomposites having multifunctional properties including magnetic properties from the magnetic material and optical properties from the inorganic semiconductor material. Various applications of such multifunctional nanocomposites are also provided.
NTIS
Magnetic Materials; Nanocrystals; Patent Applications; Semiconductors (Materials)

20080042361 GE Healthcare, Inc., Princeton, NJ, USA

Hyperpolarized Gas Transport and Storage Devices and Associated Transport and Storage Methods Using Permanent Magnets

Happer, W., Inventor; Hasson, K. C., Inventor; Zollinger, G. T. K., Inventor; 19 Jan 06; 37 pp.; In English

Contract(s)/Grant(s): NIH-R43HL62756-01

Patent Info.: Filed Filed 19 Jan 06; US-Patent-Appl-SN-11-335 006

Report No.(s): PB2008-103579; No Copyright; Avail.: CASI: A03, Hardcopy

A transport unit includes a plurality of permanent magnets arranged to provide a magnetic holding field for protecting hyperpolarized gas during storage and/or transport. The permanent magnets are configured in a relatively light weight manner to project a substantially cylindrical magnetic holding field or spherical holding field in space. The magnet arrangements can include primary magnets and field shaping secondary magnets which act to enlarge the region of homogeneity. The permanent magnet arrangement can also be provided with a cylindrical shaped flex sheet magnetically activated to provide the magnetic holding field. The permanent magnet arrangements do not require disassembly to insert or remove one or more containers of hyperpolarized gas in or out of the transport unit.

NTIS

Gas Transport; Patent Applications; Permanent Magnets; Rare Gases

20080042366 Evan Law Group, LLC, Chicago, IL, USA

Multi-Dimensional Elastic Light Scattering

Backman, V., Inventor; Roy, H., Inventor; Wali, R., Inventor; Kim, Y., Inventor; Liu, Y., Inventor; 27 Oct 05; 41 pp.; In English

Contract(s)/Grant(s): NIH-1R21CA102750

Patent Info.: Filed Filed 27 Oct 05; US-Patent-Appl-SN-11-261 452

Report No.(s): PB2008-104719; No Copyright; Avail.: CASI: A03, Hardcopy

A method of examining a sample includes measuring, as function of wavelength of light elastically scattered from the sample, at least 2 properties, selected from the group consisting of scattering angle theta of the light, scattering angle phi of the light, and polarization of the light. The scattering angle theta is an angle between backward direction and direction of propagation of the light, and scattering angle phi is an angle between incident light polarization and projection of direction of the light propagation onto a plane in which incident electric field oscillates.

NTIS

Elastic Scattering; Patent Applications; Polarized Light

20080042415 National Inst. of Standards and Technology, Gaithersburg, MD USA

Primary Acoustic Thermometry Up to 800 K

Ripple, D. C.; Defibaugh, D. R.; Gillis, K. A.; Moldover, M. R.; January 1999; 12 pp.; In English

Report No.(s): PB2008-104256; No Copyright; Avail.: CASI: A03, Hardcopy

Primary acoustic thermometers determine the thermodynamic temperature of a monatomic gas from measurements of the speed of sound in the gas. Here, we describe the design and construction of an acoustic thermometer designed to operate at temperatures up to 800 K with unprecedented accuracy. Features of our thermometer include: construction that minimizes sources of gas contamination; continuous purging of the resonator; monitoring the purity of the gas by gas chromatography; determination of the resonator's volume by in situ measurements of microwave resonance frequencies; use of novel acoustic transducers; and measurement of the resonators temperature on the International Temperature Scale of 1990 (ITS-90) with removable, long-stem standard platinum resistance thermometers (SPRTs). We are in the process of implementing this thermometer at NIST, and results will be presented at a later date.

NTIS

Platinum; Resistance Thermometers; Temperature Measurement; Temperature Scales

20080042421 State Univ. of New York, Binghamton, NY USA

Data Compression Trade-Offs for TDOA/FDOA Geo-Location Systems

Fowler, Mark L; Feb 2008; 43 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8750-06-2-0231; Proj-1038

Report No.(s): AD-A483829; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483829

The research results focus on new data compression insights and methods that can enable the sharing of data for enhanced

geo-location of RF emitters. The work was focused in four areas: (1) New Theoretical Results: Data compression ideas were applied to the issue of how to select and configure a set of available sensors for location processing. This proved to be a challenging task. (2) Refine & Extend Previous Results: The short-time Fourier transform (STFT) was integrated into the data compression algorithm and was shown to properly operate. (3) Integrate Into a Matlab-based Test-Bed: Matlab routines for data compression were developed and integrated into a single Matlab application. (4) General Location Studies: It was shown that there are issues in using previous results that were developed explicitly for sonar signal cases when the signal was modeled as wide-sense stationary Gaussian process. Results are provided for signal models suitable for the communication signal case.
DTIC
Data Compression; Position (Location); Radio Direction Finders; Tradeoffs

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ACOUSTICS

Includes sound generation, transmission, and attenuation. For noise pollution see *45 Environment Pollution*. For aircraft noise see also *02 Aerodynamics* and *07 Aircraft Propulsion and Power*.

20080041302 Naval Postgraduate School, Monterey, CA USA
Characterization of the MEMS Directional Sound Sensor Fabricated Using the SOIMUMPS Process
Dritsas, Antonios; Jun 2008; 113 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483597; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A micro-electro-mechanical system (MEMS) based directional sound sensor performance is characterized. The operation of directional sound sensor is based on the hearing organ of Ormia ochracea fly, which uses coupled bars hinged at the center to achieve the directional sound sensing. The MEMS sensor design considered in this thesis is fabricated using a process by which the sensor has two resonant vibrational modes: rocking and bending. The sensor is simulated using finite element analysis and tested by actuating the sensor using a sound stimulus. An analysis is undertaken to describe, in mathematical terms, the relationship between the sensor's amplitude of vibration and various parameters such as the angle of incidence, frequency and the intensity of sound. The experimentally-observed vibrational frequencies are found to be in good agreement with the simulated data, which supports the use of the simulation in future sensor development. The observed amplitudes of vibration are significantly greater than those of sensors fabricated with the process used in previous studies. The relationship between the amplitude of vibration and the incident angle are found to agree with the theoretical predictions. The results indicate that it is possible to fabricate miniature sound sensors that mimic the fly's hearing system.
DTIC
Acoustics; Fabrication; Microelectromechanical Systems; Sensors; Signal Detectors

20080041316 Naval Postgraduate School, Monterey, CA USA
Observations of Ocean Ambient Noise (10 Hz to 10 kHz) at the Site of a Former Navy Listening Station to the West of Point Sur, California, from January to July of 2007
Cocker, Paul; Jun 2008; 55 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483635; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Ocean acoustic recordings were obtained from January through June of 2007 at the site of a former Unites States Navy listening station to the west of Point Sur, California. These data were analyzed to determine the characteristics of the ambient acoustic noise. Direct comparisons to previous studies conducted at the same location revealed a near identical match of the pressure spectrum level in the 50 to 120 Hz frequency band to a 1994-2001 study. Comparison to a 1963-1965 study revealed a 3 to 5 dB increase in ambient noise over the 60 to 300 Hz frequency band. As expected, relating ambient noise to wind speed revealed a significant (correlation coefficient greater than 0.5) correlation between 400 Hz and 10 kHz with a maximum correlation coefficient of 0.78 near 2 kHz. Comparing shipping data from San Francisco and Los Angeles-Long Beach ports to ambient noise in the 10 to 1000 Hz band revealed obvious patterns in the relationship of the number of ships arriving or departing each day and noise level. Due to its proximity, the San Francisco shipping data had a greater effect on the ambient noise level at Point Sur. The largest value of the correlation coefficient between ambient noise and shipping traffic was 0.55 and occurred at 700 Hz.
DTIC
Acoustics; Ambience; Navy; Noise (Sound); Oceans; Recording Instruments; Underwater Acoustics

20080041324 Naval Postgraduate School, Monterey, CA USA

Improving Accuracy of Acoustic Prediction in the Philippine Sea through Incorporation of Mesoscale Environmental Effects

Freitas, Kimberly M; Jun 2008; 69 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483645; No Copyright; Avail.: Defense Technical Information Center (DTIC)

An understanding of ocean acoustic fields, their statistics, and relation to the oceanographic environment is the sine qua non of undersea warfare. In the tactically important Philippine Sea, powerful mesoscale eddies can have strong effects on acoustic fields. To quantify eddy effects, a mesoscale sound-speed model was developed and interfaced with a parabolic equation acoustic simulation. Eight combinations of frequency (20Hz/250Hz), wavenumber spectra (Stammer/Lorentzian) and source depth (50m/200m) were simulated through the model. For each combination, the unperturbed transmission loss (TL) curve and composite eddy-field TL curve were compared to assess acoustic variability caused by mesoscale ocean features. Eddies alter acoustic energy by shifting convergence zones, driving energy into the seabed, trapping energy in surface ducts, and increasing scintillation. These effects are greater at higher frequencies and deeper source depths, shifting both the mean TL difference and kMS variability on order 5-10dB. The wavenumber spectrum showed no significant effect on acoustic variability Eddies also cause horizontal out-of-plane scattering. Ray equations were manipulated to demonstrate that eddy-induced bearing-angle errors can be on order one degree at 500km, increasing as the square-root of range. Target localization errors due to angle error are on order 7km at 500km, increasing as range to 3/2 power.

DTIC

Accuracy; Acoustics; Environment Effects; Marine Environments; Mesoscale Phenomena; Predictions; Seas

20080041336 Florida Atlantic Univ., Boca Raton, FL USA

Center for Coastline Security Technology, Year 3

Glegg, Stewart; Glenn, William; Furht, Borko; Beaujean, P; Frisk, G; Schock, S; vonEllenrieder, K; Ananthakrishnan, P; Granata, R; Coulson, R; May 2008; 298 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-05-C-0031

Report No.(s): AD-A483663; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Center for Coastline Security Technology (CCST) focuses on research, simulation, and evaluation of coastal defense and marine domain awareness equipment, sensors and components. It builds upon the existing efforts and expertise in coastal systems and sensor research at the Institute for Ocean and Systems Engineering (IOSE), the Imaging Technology Center, and the Department of Computer Science at Florida Atlantic University. New technologies are needed to enhance surveillance and inspections of marine activities in the coastal zone that includes major ports, small inlets, beaches, remote coastal areas and their approaches. To be efficient and cost effective it is imperative to mount the surveillance systems and sensors on autonomous platforms that can operate unsupervised for extended periods of time. The task is to effectively integrate sensors with underwater, surface and airborne autonomous and remotely operated platforms and to incorporate video and image analysis and data mining methods to quickly and effectively identify threat events. This effort has leveraged the existing U.S. Navy marine test & evaluation facilities at the South Florida Testing Facility, which is adjacent to the major seaport at Port Everglades. This provides a unique land and aquatic test bed for the evaluation of acoustic sensors and high definition underwater and surface video mounted on unmanned fixed or mobile platforms. This report describes the continuation of the work started in Year One and Two of the CCST project. The objective of the work in Year Three was to focus on developing technology for 3D imaging. Optical applications are based on the High Resolution Video imaging systems developed by FAU's Imaging Technology Center, and, for underwater applications, a high resolution sonar systems has been developed which can be mounted on a tetherless remotely piloted underwater vehicle.

DTIC

Coasts; Remotely Piloted Vehicles; Security; Shorelines; Surveillance; Underwater Vehicles

20080041445 Sarnoff Corp., Princeton, NJ, USA

Method and Apparatus for Providing Noise Reduction

Bergen, J., Inventor; Zhang, C., Inventor; Van Der Wal, G., Inventor; 15 Mar 05; 12 pp.; In English

Contract(s)/Grant(s): GNVESD0610

Patent Info.: Filed Filed 15 Mar 05; US-Patent-Appl-SN-11-081 255

Report No.(s): PB2008-103831; No Copyright; Avail.: CASI: A03, Hardcopy

A method and apparatus for reducing noise in at least one frame in an image sequence is disclosed. A minimum function is applied to the at least one frame to produce a plurality of minimum values. A mask is generated in accordance with the

plurality of minimum values. The mask is applied to reduce the noise in the at least one frame. In one embodiment, impulse noise is reduced. In another embodiment wideband non-linear noise is reduced.
NTIS
Electronic Equipment; Noise Reduction; Patent Applications

20080041812 Rhode Island Univ., Narragansett, RI USA
Analyses of Sea Surface Height, Bottom Pressure and Acoustic Travel Time in the Japan/East Sea
Xu, Yongsheng; Jan 2006; 100 pp.; In English
Report No.(s): AD-A484166; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The observed water motions in the Japan/East Sea (JES) and the associated sea surface height and bottom pressure fields are heavily influenced by the semi-enclosed nature and the specific configuration of this marginal sea. As part of the USA Office of Naval Research JES program, a two-dimensional array of pressure-gauge-equipped inverted echo sounders (PIESs) was deployed in the southwestern JES for two years, from June 1999 to July 2001. The PIESs recorded hourly vertical acoustic travel time and pressure, which are respectively good proxies of baroclinic and barotropic sea level variability. Three topics are investigated based on the PIESs data sets: (1) implications of the in-situ measurements for improving interpretation of satellite altimetric data in the JES; (2) basin-mode oscillations in the JES; (3) vertical coupling between upper circulation and abyssal eddy fields in the JES. All the pressure records exhibit a strong remarkably similar signal (common mode). The common mode is driven by sea level changes outside the JES, atmospheric pressure, and along-strait wind stress in the straits connecting the JES to the outside ocean. The common mode has a barotropic wavelength much larger than the size of the JES, so it is in phase throughout the basin. The rms of the common mode is about 5 cm, and is energetic at time scales of 2-70 days, which are shorter than the ERS-2 satellite altimetry Nyquist period of 70 days. Our results show the common mode produces a substantial alias when sampled by satellite altimeter; furthermore, the combined aliasing effects on multi-tracks can mimic mesoscale eddies and may qualitatively alter the synoptic mapping. The alias can be suppressed by removing the common mode from satellite SSH. For time periods other than 1999-2001, 78% of the common mode variance can still be removed in the Japan/East sea by using coastal tide gauge data to infer the common mode.
DTIC
Audio Equipment; Japan; Measuring Instruments; Ocean Surface; Pressure; Satellite Altimetry; Scientific Satellites; Seas; Sounding

20080041821 Naval Postgraduate School, Monterey, CA USA
AUVFEST 05 Quick Look Report of NPS Activities
Healey, A J; Horner, D P; Kragelund, S; Wring, B; Jun 2005; 13 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484178; No Copyright; Avail.: Defense Technical Information Center (DTIC)

During the period June 6-16 2005, NPS participated in AUV Fest 2005 held at Keyport, WA. The ARIES vehicle, seen in Figure 2, was used for the first time at these events. ARIES was equipped with a Blazed Array Forward Look Sonar (FLS) in order to demonstrated a dynamic obstacle detection and avoidance behavior that is planned to be implemented in the REMUS vehicles through the SAHRV program. In all, it was a very successful exercise, during which various separate stages of the development were demonstrated and accomplished. The main objective is to direct a UUV to avoid objects in the water column that represent impediments to forward progress. Sub -sea objects such as sea mounds, reefs, and sunken ships represent threats to the current class of small UUV in use. Using a small low power blazed array sonar from Blue View Technologies, forward looking sonar images are collected, analyzed and used to declare the presence of such objects. Not only range, but also height of these objects are determined and passed to the vehicle controller. An appropriate avoidance behavior is then triggered in the vehicle. This closed loop process was developed and demonstrated.
DTIC
Sonar; Underwater Vehicles

20080041826 Cornell Lab. of Ornithology, Ithaca, NY USA
An Annotated and Federated Digital Library of Marine Animal Sounds
Bradbury, Jack W; Clark, Christopher; Fristrup, Kurt; Mellinger, David K; Moore, Sue E; Jan 2004; 7 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-04-1-0663
Report No.(s): AD-A484189; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Macaulay Library is the world's largest archive of animal sounds and has been selected by the Office of Naval

Research as a major repository for the deposition, digital, archival, review, and retrieval of the many recordings of marine animals made over the last half century. Archived marine recordings pose challenging retrieval problems given the typically long intervals of silence between animal sounds and the multiplicity of species detectable in any given recording. One goal of this project is to design software that will permit remote experts to annotate the content of long recordings archived at the Macaulay Library through their web browsers. Annotations will permit subsequent searches of the archive database to retrieve not only suitable recordings, but also those parts of a recording meeting the search criteria. The project also seeks to define and extract a set of acoustic features from all archived marine recordings that can be used in subsequent search and retrieval tasks. Both capabilities will be unique to this sound collection, and will greatly enhance the accessibility and the utility of the archive to scientists, students, educators, military personnel, and the media.
DTIC
Acoustics; Annotations; Libraries; Marine Biology

20080042047 Oregon State Univ., Corvallis, OR USA
Novel Acoustic Techniques for Assessing Fish Schooling in the Context of an Operational Ocean Observatory
Benoit-Bird, Kelly J; Jones, Chris; Schofield, Oscar; Glenn, Scott; Quinlan, John; Condiotty, Jeff; Jan 2005; 10 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N000140510652
Report No.(s): AD-A483530; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Fish aggregation is important in terms of biology, fisheries, and measurement, quantitative analyses of gregarious movement behaviors remain relatively rare (Turchin 1989). Fish aggregation has most often been studied in easily accessed fish or fish easily maintained in the laboratory such as minnows and dace (see a review in Pitcher and Parrish 1993). Measurements of fish aggregations are often difficult, particularly in pelagic environments. Our goal is to develop new acoustic techniques that have the potential to serve as measurement tools to quantify this ubiquitous and important behavior. This project brings together a team with expertise in acoustics, engineering, biology, fisheries, and oceanography to develop and apply acoustic techniques to measure schooling in pelagic fish. We will combine traditional, split-beam fisheries echosounding techniques and direct sampling with new acoustic techniques and new platforms in a study area monitored by an existing operational ocean observatory.
DTIC
Acoustics; Fishes; Observatories; Oceans; Quantitative Analysis

20080042058 Devault (Krieg) , LLP, Indianapolis, IN, USA
Systems and Methods for Interference-Suppression with Directional Sensing Patterns
Feng, A. S., Inventor; Lockwood, M. E., Inventor; Jones, D. L., Inventor; Bilger, R. C., Inventor; Lansing, C. R., Inventor; 9 Apr 03; 24 pp.; In English
Contract(s)/Grant(s): 240-6762A
Patent Info.: Filed Filed 9 Apr 03; US-Patent-Appl-SN-10-409 969
Report No.(s): PB2008-102520; No Copyright; Avail.: CASI: A03, Hardcopy

System is disclosed including an acoustic sensor array coupled to processor. System processes inputs from array to extract a desired acoustic signal through the suppression of interfering signals. The extraction/suppression is performed by modifying the array inputs in the frequency domain with weights selected to minimize variance of the resulting output signal while maintaining unity gain of signals received in the direction of the desired acoustic signal. System may be utilized in hearing, cochlear implants, speech recognition, voice input devices, surveillance devices, hands-free telephony devices, remote telepresence or teleconferencing, wireless acoustic sensor arrays, and other applications.
NTIS
Acoustics; Detection; Patent Applications; Signal Detectors; Signal Transmission; Sound Waves

20080042288 Weingarten, Schurgin, Gagnebin and Lebovici. LLP, Boston, MA, USA
Noise Adaptive Sonar Signal Processor
Intrator, N., Inventor; Cooper, L. N., Inventor; Neretti, N., Inventor; 8 Jun 04; 17 pp.; In English
Contract(s)/Grant(s): ARO DAAD 19-02-1-0403; ONR N00012-02-C-02960
Patent Info.: Filed Filed 8 Jun 04; US-Patent-Appl-SN-10-559 623
Report No.(s): PB2008-103925; No Copyright; Avail.: CASI: A03, Hardcopy

A system and method of performing sonar range estimations in a noisy sonar environment. The system includes a sensor,

a transmitter, a receiver, a plurality of band-pass filters, a cross correlator, and a data analyzer. The transmitter transmits a pulse through a transmission medium. The pulse travels through the transmission medium until it strikes an object, which returns an echo to the sensor. The sensor provides the echo to the receiver, which provides an indication of the echo to the band-pass filters. The respective band-pass filters provide filtered versions of the echo and pulse to the cross correlator, which performs multiple cross correlation operations on the filtered echo and pulse. The cross correlator provides output data to the data analyzer, which uses the data to estimate the SNR in the environment and to determine a pulse center frequency corresponding to the estimated SNR. By controlling the center frequency of pulses emitted by the transmitter based on information provided by the data analyzer, the system obtains sonar range estimations with increased accuracy.
NTIS
Adaptation; Patent Applications; Signal Analyzers; Signal Processing; Sonar

20080042292 NASA Langley Research Center, Hampton, VA, USA
Recent Developments in Aircraft Flyover Noise Simulation at NASA Langley Research Center
Rizzi, Stephen A.; Sullivan, Brenda M.; Aumann, Aric R.; October 13, 2008; 14 pp.; In English; NATO RTO Specialist Meeting AVT-158 on Noise Issues Associated with Gas Turbine Powered Military Vehicles, 13-17 Oct. 2008, Montreal, Canada; Original contains color illustrations
Contract(s)/Grant(s): WBS 877868.02.07.07.04.01
Report No.(s): AVT-158/RSM-023; Paper 17; Copyright; Avail.: CASI: A03, Hardcopy

The NASA Langley Research Center is involved in the development of a new generation of synthesis and simulation tools for creation of virtual environments used in the study of aircraft community noise. The original emphasis was on simulation of flyover noise associated with subsonic fixed wing aircraft. Recently, the focus has shifted to rotary wing aircraft. Many aspects of the simulation are applicable to both vehicle classes. Other aspects, particularly those associated with synthesis, are more vehicle specific. This paper discusses the capabilities of the current suite of tools, their application to fixed and rotary wing aircraft, and some directions for the future.
Author
Acoustic Simulation; Noise Pollution; Aerodynamic Noise; Aeroacoustics; Aircraft Noise; Computerized Simulation

20080042299 NASA Langley Research Center, Hampton, VA, USA
Report on the Joint Eglin Acoustic Week III
Watts, Michael E.; Conner, David A.; Smith, Charles E.; October 15, 2008; 11 pp.; In English; AHS Southwest Region Technical Specialists? Meeting, 15-17 Oct. 2008, Dallas-Fort Worth, TX, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 877868.02.07.07.04.01; Copyright; Avail.: CASI: A03, Hardcopy

A series of three flight tests have been conducted at Eglin Air Force Base located in the Florida panhandle. The first was the Acoustics Week flight test conducted in September 2003. The second was the NASA Heavy Lift Rotorcraft Acoustic Flight Test conducted in October-November 2005. The most recent was the Eglin Acoustic Week III test conducted in August-September 2007. This series of tests have acquired acoustic data for a number of rotary and fixed wing aircraft that are used to generate noise semi-spheres used in predicting the acoustic footprint for prescribed flight operations. This extensive database can be used to determine the impact of flight operations on communities around a terminal area. Another valuable use of the semi-spheres is determining the long-range propagation of noise for civilian and military purposes. This paper will describe the third in this series of tests.
Author
Flight Tests; Acoustics; Rotary Wing Aircraft; Noise Prediction (Aircraft)

20080042384 NASA Johnson Space Center, Houston, TX, USA
Noise Control in Habitable Space Vehicles and Enclosures
Grosveld, Ferdinand W.; Goodman, Jerry R.; October 2008; 8 pp.; In English; 3rd IAASS Conference (International Assocation of Space Safety), 21-23 Oct. 2008, Rome, Italy; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

Acoustics is one of the top habitability issues in the International Space Station (ISS). The purpose of this paper is to discuss the issues involved with noise control in habitable space enclosures to ensure that the crews are provided a safe, comfortable, and operationally acceptable environment. Various analyses, treatments, and noise control design applications used in the Space Shuttle, Spacelab, and ISS Programs are presented. Different tools used in the acoustic analyses are described. The value of testing and verification in noise control is emphasized, especially in determining the sound power of

noise sources and verification of the progressive noise estimates. Post-design noise mitigation is discussed, including ISS examples of such efforts. It is concluded that to achieve acceptable and safe noise levels in the crew habitable space the implementation of an effective noise control plan is needed and the support of established acoustic requirements and noise control efforts is essential.
Author
Noise Reduction; International Space Station; Acoustic Measurement; Spacecraft Control; Noise Intensity; Noise (Sound); Habitability; Signal Analyzers

72
ATOMIC AND MOLECULAR PHYSICS

Includes atomic and molecular structure, electron properties, and atomic and molecular spectra. For elementary particle physics see *73 Nuclear Physics*.

20080041285 Army Research Lab., Adelphi, MD USA
Near-Infrared Surface-Enhanced-Raman-Scattering (SERS) Mediated Identification of Single, Optically Trapped, Bacterial Spores
Alexander, Troy A; Gillespie, James B; Pellegrino, Paul; Fell, Nick; Wood, Gary L; Salamo, Greg; Jul 1, 2003; 9 pp.; In English
Contract(s)/Grant(s): DAA04-96-C-0086
Report No.(s): AD-A483555; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A novel methodology has been developed for the investigation of bacterial spores. Specifically, this method has been used to probe the spore coat composition of several Bacillus species. This technique may be useful in many applications; most notably, development of novel detection schemes toward potentially harmful biological agents. This method would also be useful as an ancillary environmental monitoring system where sterility is of importance (i.e., food preparation areas as well as invasive and minimally invasive medical applications). This unique detection scheme is based on the near-infrared (NIR) Surface-Enhanced-Raman-Scattering (SERS) from single, optically trapped, bacterial spores. The SERS spectra of several bacterial spores in aqueous media have been measured using SERS substrates based on 60-nm diameter gold colloids bound to 3-Aminopropyftriethoxysilane derivatized glass. The light from a 785-nm laser diode was used to capture/manipulate as well as simultaneously excite the SERS of an individual bacterial spore. The collected SERS spectra were examined for uniqueness and the applicability of this technique for the species identification of bacterial spores.
DTIC
Bacteria; Raman Spectra; Raman Spectroscopy; Spores

20080041299 Naval Research Lab., Bay Saint Louis, MS USA
A Predictive Model for Satellite-Derived Phytoplankton Absorption Over the Louisiana Shelf Hypoxic Zone: Effects of Nutrients and Physical Forcing
Green, Rebecca E; Gould, Jr, Richard W; Jun 6, 2008; 18 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483593; NRL/JA/7330-07-7083; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We investigated environmental forcing mechanisms of phytoplankton absorption near the Mississippi River delta using multi-year satellite data. An algorithm for the phytoplankton absorption coefficient was developed from in situ measurements and applied to ocean color imagery. We employed a suite of chemical and physical forcing variables, including surface currents. For satellite-derived time series (2002-2004) correlation and stepwise regression analyses revealed the most important forcing variables on the Louisiana shelf. Mississippi River discharge and nitrate concentration were the two most important predictors over the hypoxic zone (defined by its maximum extent).
DTIC
Absorption; Hypoxia; Phytoplankton; Predictions; Satellite Observation

20080041300 Naval Research Lab., Bay Saint Louis, MS USA
Statistical Models for Sediment/Detritus and Dissolved Absorption Coefficients in Coastal Waters of the Northern Gulf of Mexico
Green, Rebecca E; Gould, Jr , Richard W; Ko, Dong S; Mar 13, 2008; 14 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483594; NRL/JA/7330-07-7215; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We developed statistically-based, optical models to estimate tripton (sediment/detrital) and colored dissolved organic

matter (CDOM) absorption coefficients from physical hydrographic and atmospheric properties. The models were developed for northern Gulf of Mexico shelf waters using multi-year satellite and physical data. First, empirical algorithms were developed, based on comparison with a large data set of cruise measurements from northern Gulf shelf waters; these algorithms were then applied to a time series of ocean color satellite imagery for 2002-2005. Unique seasonal timing was observed in satellite-derived optical properties.
DTIC
Absorptivity; Coastal Water; Coasts; Gulf of Mexico; Mathematical Models; Sediments; Statistics

20080041704 Army Research Lab., Adelphi, MD USA
Substrate Evaluation And Optimization For Surface-Enhanced Raman Spectroscopy Of Bacteria
Fell, Jr , Nicholas F; Alexander, Troy; Dorschner, Kristl; Tombrello, Christin; Fountain, III, Augustus W; Jul 1, 2003; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484004; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484004

The threat of biological agents to soldiers and the civilian community was amply demonstrated in the fall of 2001. The feasibility of using surface-enhanced Raman spectroscopy (SERS) to detect and identify bacteria is being evaluated. In order to use SERS for bacterial detection and identification, it is necessary to determine the most appropriate type of SERS substrate to use. We are examining gold colloids in suspension, immobilized gold colloids, electrochemically roughened gold, periodic particle arrays (PPA), and film over nanosphere substrates (FONS). Briefly, PPA's are prepared by depositing gold or silver in the interstitial spaces in a close-packed array of polystyrene nanospheres, while FONS are prepared by depositing approximately half a nanosphere diameter of gold or silver on top of a closepacked array of polymer nanospheres. We are evaluating each of these substrate types to determine which will have a high affinity for bacteria, whether we need to modify the surface of the substrate to attract bacteria, and the degree to which each type of substrate enhances the Raman scattering from the bacterial targets. At this point, our initial examination of gold colloids immobilized on glass surfaces has yielded mixed results.
DTIC
Bacteria; Optimization; Raman Spectra; Raman Spectroscopy; Substrates

73
NUCLEAR PHYSICS

Includes nuclear particles; and reactor theory. For space radiation see *93 Space Radiation*. For atomic and molecular physics see *72 Atomic and Molecular Physics*. For elementary particle physics see *77 Physics of Elementary Particles and Fields*. For nuclear astrophysics see *90 Astrophysics*.

20080041123 North Carolina State Univ., Raleigh, NC USA
Quantum Analysis of a Microcavity-Tuned Bloch Oscillator for Tunable Spontaneous Emission and Absorption of Terahertz Radiation
Iafrate, G J; Jun 20, 2007; 34 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-06-1-0348
Report No.(s): AD-A483274; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483274

We investigate the spontaneous emission of radiation for a Bloch electron traversing a single energy miniband of a superlattice in an external homogeneous electric field subjected the influence of resonant microcavity and dephasing from an internal inhomogeneous electric field. The spontaneous emission for the cavity-enhanced Bloch electron probability amplitude becomes damped and frequency shifted due to the perturbing inhomogeneity when treated in a long-time, time-dependent perturbation theory relative to the Bloch-accelerated dynamics in the electrodynamic radiation field. The frequency shift is proportional to the diagonal matrix elements of the Hamiltonian for the perturbing inhomogeneity with respect to the instantaneous Bloch eigenstates, and the damping term is proportional to the off-diagonal matrix elements of the perturbing Hamiltonian with the instantaneous eigenstates summed to the final states as determined in a golden-rule like fashion. The resulting general theory is reduced for the specific cases of an abrupt and smoothly varying potentials but emphasis is given to the case of a 'comb' of Slater-Koster impurities with randomly distributed interface roughness at all lattice sites. From the Slater-Koster case, the relaxation approximation is developed where the damping term is considered to be a constant and the

frequency shift is ignored. Analysis of total power shows that dephasing degradation effects are more than compensated for by enhancements derived by microcavity confinement.
DTIC
Electron Emission; Oscillators; Quantum Electrodynamics; Radiation Absorption; Spontaneous Emission

20080041469 Idaho National Lab., Idaho Falls, ID, USA
Characterization of an Advanced Gadolinium Neutron Absorber Alloy by Means of Neutron Transmission. Global 2007
Wachs, G. W.; Sterbentz, J. W.; Montierth, L. M.; Tovesson, F. K.; Hill, T. S.; Sep. 2007; 7 pp.; In English
Report No.(s): DE2007-918177; INL/CON-07-12838; No Copyright; Avail.: National Technical Information Service (NTIS)

Neutron transmission experiments were performed on samples of an advanced nickel-chromium- molybdenumgadolinium (Ni-Cr-Mo-Gd) neutron absorber alloy. The primary purpose of the experiments was to demonstrate the thermal neutron absorbing capability of the alloy at specific gadolinium dopant levels. The new alloy is to be deployed for criticality control of highly enriched DOE SNF. For the transmission experiments, alloy test samples were fabricated with 0.0, 1.58 and 2.1 wt% natural gadolinium dispersed in a Ni-Cr-Mo base alloy. The transmission experiments were successfully carried out at the Los AlamosNeutron Science Center (LANSCE). Measured data from the neutron transmission experiments were compared to calculated results derived from a simple exponential transmission formula using only radiative capture cross sections. Excellent agreement between the measured and calculated results demonstrated the expected strong thermal absorption capability of the gadolinium poison and in addition, verified the measured elemental composition of the alloy test samples. The good agreement also indirectly confirmed that the gadolinium was dispersed fairly uniformly in the alloy and the ENDF VII radiative capture cross section data were accurate.
NTIS
Gadolinium Alloys; Neutron Absorbers; Neutrons

20080041472 Idaho National Lab., Idaho Falls, ID, USA
Physics Characterization of a Heterogeneous Sodium Fast Reactor Transmutation System. Global 2007
Bays, S. E.; Sep. 2007; 12 pp.; In English
Report No.(s): DE2007-918168; INL/CON-07-12476; No Copyright; Avail.: National Technical Information Service (NTIS)

The threshold-fission (fertile) nature of Am-241 is used to destroy this minor actinide by capitalizing upon neutron capture instead of fission within a sodium fast reactor. This neutron-capture and its subsequent decay chain leads to the breeding of even mass number plutonium isotopes. A slightly moderated target design is proposed for breeding plutonium in an axial blanket located above the active fast reactor driver fuel region. A parametric study on the core height and fuel pin diameter-to-pitch ratio is used to explore the reactor and fuel cycle aspects of this design. This study resulted in both a non-flattened and a pancake core geometry. Both of these designs demonstrated a high capacity for removing americium from the fuel cycle. A reactivity coefficient analysis revealed that this heterogeneous design will have comparable safety aspects to a homogeneous reactor of the same size.
NTIS
Fast Nuclear Reactors; Heterogeneity; Sodium; Transmutation

20080041621 RAND Corp., Santa Monica, CA USA
Motivations and Possible Actions of Potential Criminal Adversaries of U.S. Nuclear Programs: Executive Summary
Bass, Gail; Jenkins, Brian; Kellen, Konrad; Krofcheck, Joseph; Petty, Geraldine; Reinstedt, Robert; Ronfeldt, David; Feb 1980; 31 pp.; In English
Report No.(s): AD-A483789; RAND-R-2554/1-CL; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483789

This report summarizes the findings of a study of the motivations and intentions of potential criminal adversaries of U.S. nuclear programs and facilities. The study was based on two premises. The first is that if one understands motivations, one can infer the actions and targets that an adversary is likely to prefer. The second is that given such inferences, and linking them to information about the material and operational capabilities of various types of adversaries, those responsible for nuclear security will be better able to assess the potential threat to nuclear programs and to devise more effective systems for deterring and defending against nuclear crimes. The authors use the term ‘nuclear programs and facilities’ in its broadest sense, to include weapon fabrication facilities, civilian nuclear energy facilities, facilities in the fuel cycle, nuclear research facilities,

facilities that fabricate fuel for naval reactors, and all related transport of nuclear material. The term 'nuclear crime' refers to a malevolent criminal action against a nuclear target or involving nuclear material or weapons. The authors are most concerned with crimes that may cause significant damage or disruption, and especially with those crimes that may directly or indirectly imperil public safety. They include among these attack, seizure, or sabotage of a nuclear facility; threats against nuclear facility personnel or their kidnapping or assassination; theft or diversion of nuclear material; release of radioactive materials; theft or detonation of a nuclear weapon; construction of an improvised nuclear device; and extortion involving nuclear materials or weapons. The remainder of this section describes the study's approach to the problem and offers a simple typology of motivations. Section II presents a matrix that links specific motivations with the actions they might inspire and flags types of actions that have already occurred. Section III reviews the study's major conclusions.
DTIC
Crime; Motivation; Nuclear Power Plants; Nuclear Reactors; Research Facilities

20080041622 RAND Corp., Santa Monica, CA USA
Puerto Rican Terrorists: A Possible Threat to U.S. Energy Installations?
Sater, William; Oct 1981; 41 pp.; In English
Report No.(s): AD-A483790; RAND-N-1764-SL; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483790

The USA has had its fair share of terrorist incidents, but surprisingly few have been grave, compared to incidents in other parts of the world. The exceptions have been attacks by Puerto Rican terrorists who have been active in this country for more than three decades. These terrorists attained worldwide notoriety in 1950, when they attempted to assassinate President Harry Truman. Four years later, in 1954, they followed with an armed assault in the U.S. House of Representatives, wounding five congressmen. These groups have carried out attacks in the USA and in Puerto Rico on various targets such as banks, FBI offices, and military installations. Their most deadly attack to date occurred in 1975, when they bombed the Fraunces Tavern in New York, killing 4 people and injuring 63 others. Who are these Puerto Rican terrorists? How numerous are they and what resources do they command? What are their political or other aims? What are their targets? This Rand Note attempts to answer these questions using information from the available open literature and interviews with law enforcement officials. By far the best known of the Puerto Rican terrorist groups is the FALN (Fuerzas Armadas de Liberacion Nacional). The overall declared aim of the group is Puerto Rican independence or separate nationhood, an aim that is shared by less than 10 percent of the Puerto Rican population. The FALN and other Puerto Rican terrorist organizations are of particular interest, especially to the energy industry, for two reasons: (1) Puerto Rican terrorist groups have struck energy facilities on their own island, (2) the FALN made a threat against nuclear targets in the USA during their seizure of the Dominican Republic's embassy in Bogota, Colombia, in March 1980. Although no evidence exists as yet to indicate that they have the capability of successfully attacking a nuclear installation, their threats against the nuclear industry must be taken seriously.
DTIC
Nuclear Power Plants; Nuclear Reactors; Puerto Rico; Targets; United States

20080041658 Columbia Univ., New York, NY USA
Pegram Nuclear Physics Laboratories Progress Report for January 1969 through December 1969 to the USA Atomic Energy Commission
Dec 1969; 223 pp.; In English
Contract(s)/Grant(s): AT(30-1)-73
Report No.(s): AD-A483869; NYO-73-293; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483869

This report contains the following 7 sections on nuclear physics: Section I - Neutron Physics; Section II - Nuclear Reactions with Charged Particles; Section III - Beta and Gamma Spectroscopy and its Application to the Study of Nuclear Structure and Weak Interaction; Section IV - Muonic Atoms and Nuclear Structure; Section V - Neutron Interactions with Condensed Matter; Section VI - Kinetics of Neutron and Photon Gases; Section VII - Electronic Instrument Development. The appendices include journal publications, papers presented at meetings and dissertations.
DTIC
Nuclear Electric Power Generation; Nuclear Physics; United States

20080041671 Michigan State Univ., East Lansing, MI USA

Grid-Free Electrostatic Plasma Simulations

Christlieb, Andrew; Jul 9, 2008; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-07-1-0144

Report No.(s): AD-A483901; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483901

This report summarizes work done between September 2007 and June 2008 related to the development of a set of grid-free simulation tools for problems in plasma dynamics. As noted in the abstract on page one, the research objectives are: (1) to develop a grid-free field solver, fluid model, and kinetic model, (2) to evaluate these tools in comparison with traditional mesh-based methods, and (3) to demonstrate the capability of the grid-free approach in an application of USAF interest. The past year's work has focused on: (1) Grid-free 3D Direct Simulation Monte Carlo and optimal parallel implementation, (2) application of grid-free Direct Simulation Monte Carlo methods to the continuous wave formation of a Bose Einstein condensate and Hypersonic Flows and, (3) Validation of grid-free agents MONICO and G2. (4) Boundary integral methods and Regularized Particles, (5) Boundary Integral Corrected PIC-An Advanced Subcell Method (6) Extended the treecode to kernels of the from re cr, ideal for spacecraft plume simulations. The work accomplished has provided several key results, as described below. Basic plasma science plays an increasingly significant role in applications of importance to the USA Air Force (USAF). These include the study of satellites and how they interact with an ion engine, the use of electronic tethers to protect satellites and how solar eruptions effect satellites. Additional examples include the basic physics of magnetrons for use in directed energy (DE) systems, the prediction and prevention of arc formation in DE systems, understanding intense laserplasma interaction as it relates to space propulsion, non-destructive materials testing for turbine blades in aircraft, and the study of Penning traps as a potential way of trapping anti-protons and positrons to create and store anti-hydrogen as a fuel, etc.

DTIC

Free Electrons; Kinetics; Plasmas (Physics); Simulation

20080041708 RAND Corp., Santa Monica, CA USA

Motivations and Possible Actions of Potential Criminal Adversaries of U.S. Nuclear Programs

Bass, Gail; Jenkins, Brian; Kellen, Konrad; Krofcheck, Joseph; Petty, Geraldine; Reinstedt, Robert; Ronfeldt, David; Feb 1980; 101 pp.; In English

Report No.(s): AD-A484016; RAND-R-2554-SL; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA484016

This report analyzes the motivations and intentions of potential criminal adversaries of U.S. nuclear programs and facilities, from which it is possible to draw plausible inferences about actions and targets they are likely to prefer. The term 'nuclear programs and facilities' is used in its broadest sense to include weapon fabrication facilities, civilian nuclear energy facilities and facilities in the fuel cycle, nuclear research facilities, facilities that fabricate fuel for naval reactors, and all related transport of nuclear material. Chapters 2, 3, and 4 explore what the three major motivational categories that might inspire nuclear-related crime. Chapter 2 deals with ideologically motivated adversaries, such as political terrorists and anti-nuclear extremists. Chapter 3 examines economically motivated adversaries, those who might engage in nuclear crime for financial gain. Chapter 4 discusses people who may be driven by personal motives, drawing largely on an analysis of psychotic bombers. Chapter 5 analyzes a special category of potential adversaries -- employees of nuclear industries -- whose motivations could be ideological, economic, or personal. Chapters 6 and 7, respectively, report the authors' analyses of the motivations behind arson and mass murder, two non-nuclear crimes that serve as analogs for possible actions in the nuclear domain. Chapter 8 gives an overview of the nuclear incidents that have already occurred and examines the apparent motivations behind threat messages involving claimed possession of nuclear material or weapons. Chapter 9 considers the climate for potential malevolent actions given recent news and fictional coverage of nuclear programs and the accident at Three Mile Island. Chapter 10 presents and discusses a matrix linking specific motivations with the possible actions they might inspire. Chapter 11 reviews the authors' conclusions and their implications for safeguarding nuclear facilities.

DTIC

Crime; Motivation; Nuclear Power Plants; Nuclear Reactors; Research Facilities

20080042006 Air Force Research Lab., Edwards AFB, CA USA

Effects of a Variable-Phase Transverse Acoustic Field on a Coaxial Injector at Subcritical and Near-Critical Conditions (Preprint)

Rodriguez, Juan I; Leyva, Ivett A; Talley, Douglas; Chehroudi, Bruce; May 2008; 12 pp.; In English

Contract(s)/Grant(s): Proj-2308

Report No.(s): AD-A483312; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483312

An experimental study that focuses on the effects of a variable transverse acoustic field on an N2 shear coaxial jet is presented. The coaxial jet is exposed to different acoustic conditions by varying the phase between two acoustic sources. The main objective of this investigation is to analyze the effect of transverse acoustic forcing with variable phase on the magnitude of the inner-jet dark-core length. The coaxial jet is exposed to a subcritical and near-critical pressure environment. The measurements are performed on backlit images of the coaxial jet obtained with a high-speed camera. The momentum flux ratio of the outer to the inner jet is varied from 1 to 20 for subcritical conditions and from 0.6 to 5 for near-critical conditions. The resonant frequency of the system is approximately 3 kHz and the maximum pressure variation with respect to total pressure is 3%. It is found that at subcritical pressures the effects of these variable acoustic fields on the length of the dark core achieve a maximum for momentum flux ratios between 1 to 5.

DTIC

Acoustics; Injectors; Sound Fields

20080042036 Idaho National Lab., Idaho Falls, ID, USA

New Approach to Development of Voluntary Decommissioning Standards

Zull, L. M.; Boing, L. E.; Meservey, R. H.; Sep. 2007; 4 pp.; In English

Report No.(s): DE2007-918167; INL/CON-07-12248; No Copyright; Avail.: Department of Energy Information Bridge

The purpose of the Decontamination, Decommissioning, and Reutilization (DDR) Division of the American Nuclear Society (ANS) is to advance the technology of decontamination, decommissioning, and reutilization of former nuclear installations, materials, facilities, and sites (1). To this end, collective decommissioning industry experiences and lessons learned are shared with others in the nuclear industry and the public. An integral part of the work of the DDR Division is the preparation of voluntary decommissioning standards that can be used by the decommissioning industry. These standards will be prepared by the recently reestablished DDR Standards Committee, which intends to work cooperatively with other divisions of the ANS and other organizations to develop various decommissioning standards. ASTM International is one of the external organizations involved in the development of consensus standards for the decommissioning of nuclear facilities. This paper describes the new work of the DDR Standards Committee in a cooperative initiative with ASTM International to develop voluntary consensus standards for nuclear decommissioning work.

NTIS

Decommissioning; Organizations; Standardization

74
OPTICS

Includes light phenomena and the theory of optical devices; for specific optical devices see also *35 Instrumentation and Photography*. For lasers see *36 Lasers and Masers*.

20080040850 Department of the Army, Washington, DC, USA

Monoblock Laser (PAT-APPL-10-974-830)

Nettleton, J. E., Inventor; 28 Oct 04; 5 pp.; In English

Patent Info.: Filed Filed 28 Oct 04; US-Patent-Appl-SN-10-974 830

Report No.(s): PB2008-102815; No Copyright; Avail.: CASI: A01, Hardcopy

An improved monoblock laser cavity is made by applying circular apodizing coatings to the various components of the monoblock laser. The apodization of the laser cavity faces improves the beam divergence of the laser and thus, increases brightness, by encouraging only the lower order modes to lase.

NTIS

Lasers; Patent Applications

20080040851 Department of the Air Force, Washington, DC, USA
Monoblock Laser (PAT-APPL-10-974 798)
Nettleton, J. E., Inventor; 28 Oct 04; 4 pp.; In English
Patent Info.: Filed Filed 28 Oct 04; US-Patent-Appl-SN-10-974 798
Report No.(s): PB2008-102814; No Copyright; Avail.: CASI: A01, Hardcopy

An improved monoblock laser cavity is made by elongating the Optical parametric oscillation (OPO) cavity. This can be accomplished by changing the coatings on the OPO material and Q-switch and by elongating the OPO cavity to approximately 2 to 3 times the OPO crystal length. The increase in the length of the OPO cavity will improve the beam divergence of the laser.

NTIS
Lasers; Patent Applications

20080040908 Daniel L. Dawes and Myers, Dawes, Andras and Sherman, LLP, Irvine, CA, USA
Apparatus and Method for Monitoring Deep Tissue Temperature Using Broadband Diffuse Optical Spectroscopy
Merritt, S., Inventor; Tromberg, B. J., Inventor; Cerussi, A. E., Inventor; Durkin, A. J., Inventor; 7 Oct 05; 26 pp.; In English
Contract(s)/Grant(s): RR01192
Patent Info.: Filed Filed 7 Oct 05; US-Patent-Appl-SN-11-246 369
Report No.(s): PB2008-104339; No Copyright; Avail.: CASI: A03, Hardcopy

A method for noninvasively determining deep tissue temperature comprises measuring data relating to spectral shifts of chromophore absorption in tissue using broadband diffuse optical spectroscopy and generating a temperature reading corresponding to the spectral shift of an absorption peak of the chromophore. A bound water correction is made to the spectral shift. A frequency domain measurement at multiple wavelengths is made to determine the absolute absorption and scattering values between 600 and 1050 nm. The measurement of an absolute absorption comprises measuring an absolute absorption coefficient of selected tissue and further comprising deducing concentrations of tissue composition including lipids, deducing information related to heterogeneity and integrity of tissue matrix, and deducing temperature heterogeneity related to vulnerable plaque in vascular tissue. The measurement comprises making a measurement in the range of 600-1100 nm to interrogate a vessel wall in the presence of blood.

NTIS
Broadband; Patent Applications; Spectroscopy

20080041173 Naval Research Lab., Washington, DC USA
High Quantum Efficiency Long-Wave Infrared Photodiodes using W-Structured Type-II Superlattices
Aifer, E H; Canedy, C L; Tischler, J G; Warner, J H; Vurgaftman, I; Bewley, W W; Meyer, J R; Jackson, E M; Kim, J C; Whitman, L W; Jan 2006; 11 pp.; In English
Report No.(s): AD-A483435; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483435

Recent improvements in material quality and design have led to large improvements in the quantum efficiency (QE) of long-wave infrared (LWIR) photodiodes based on W-structured type-II superlattices (WSL), which now have achieved external QE of up to 35% on an 11.3 micron cutoff photodiode operating at 80K. While single band and dual band WSLs have been demonstrated with cutoff wavelengths out to 17 micron, the initial devices also showed significant losses of photo-excited carriers resulting in QE levels of less or equal to 10%. Here we describe recent results in which these losses have been dramatically reduced by modifying the WSL barrier layers to increase the mini-band width and improve the material properties. An additional 35-55% increase in QE also resulted from the use of semi-transparent Te doped n-GaSb substrates that allowed for IR reflections off the backside from the Au plated chip carrier. A series of PIN photodiodes using the improved WSL, with intrinsic regions from 1 to 4 micron thick, were used to study minority carrier transport characteristics in the new structure. As a result of the improved design and material properties, the electron diffusion length in the undoped i-region, as determined from a theoretical fit to the thickness-dependent data, was 3.5 micron, allowing for much higher collection efficiency in PIN photodiodes with intrinsic regions up to 4 micron thick.

DTIC
Infrared Radiation; Photodiodes; Quantum Efficiency; Superlattices

20080041444 Quarles and Brady, LLP, Milwaukee, WI, USA

Fan-Beam and Cone-Beam Image Reconstruction Using Filtered Backprojection of Differentiated Projection Data

Chen, G. H., Inventor; 22 Nov 05; 20 pp.; In English

Contract(s)/Grant(s): EB001683

Patent Info.: Filed Filed 22 Nov 05; US-Patent-Appl-SN-11-284 500

Report No.(s): PB2008-103832; No Copyright; Avail.: CASI: A03, Hardcopy

A tomographic image reconstruction method produces either 2D or 3D images from fan beam or cone beam projection data by filtering the backprojection image of differentiated projection data. The reconstruction is mathematically exact if sufficient projection data is acquired. A cone beam embodiment and both a symmetric and asymmetric fan beam embodiment are described.

NTIS

Electron Beams; Image Reconstruction; Patent Applications; Radiography; Tomography

20080041446 Digital Optics Technologies, Inc., Rolling Meadows, IL, USA

Method and System for Combining Multiple Laser Beams Using Transmission Holographic Methodologies

Donoghue, J., Inventor; Andrews, M., Inventor; 22 Nov 04; 12 pp.; In English

Contract(s)/Grant(s): F29601-00-C-0084; F29601-01-C-0015

Patent Info.: Filed Filed 22 Nov 04; US-Patent-Appl-SN-10-904 669

Report No.(s): PB2008-103830; No Copyright; Avail.: CASI: A03, Hardcopy

The Holographic Beam Combiner, (HBC), is used to combine the output from many lasers into a single-aperture, diffraction-limited beam. The HBC is based on the storage of multiple holographic gratings in the same spatial location. By using a photopolymer material such as quinone-doped polymethyl methacrylate (PMMA) that uses a novel principle of 'polymer with diffusion amplification' (PDA), it is possible to combine a large number (N) of diode lasers, with an output intensity and brightness 0.9 N times as much as those of the combined outputs of individual N lasers. The HBC will be a small, inexpensive to manufacture, and lightweight optical element. The basic idea of the HBC is to construct multiple holograms onto a recording material, with each hologram using a reference beam incident at a different angle, but keeping the object beam at a fixed position. When illuminated by a single read beam at an angle matching one of the reference beams, a diffracted beam is produced in the fixed direction of the object beam. When multiple read beams, matching the multiple reference beams are used simultaneously, all the beams can be made to diffract in the same direction, under certain conditions that depend on the degree of mutual coherence between the input beams.

NTIS

Holography; Laser Beams; Patent Applications

20080041448 Gauthier and Connors, LLP., Boston, MA, USA

System and Method for Forming Well-Defined Periodic Patterns Using Achromatic Interference Lithography

Savas, T. A., Inventor; Smith, H. L., Inventor; 19 Nov 04; 22 pp.; In English

Contract(s)/Grant(s): DAAG55-98-1-0130; DMR-9871539

Patent Info.: Filed Filed 19 Nov 04; US-Patent-Appl-SN-10-993 529

Report No.(s): PB2008-103828; No Copyright; Avail.: CASI: A03, Hardcopy

A beam, from a short-coherence-length source, is split and recombined by diffraction gratings not necessarily equal in spatial period. The recombining beams overlap and expose a common area on a substrate. The exposed area on the substrate is defined or shaped by at least one aperture in the beam paths. After exposure of one shaped area, relative translation between components permits exposure of another shaped area on the substrate. Additionally or alternatively, by introducing either rotation or translation between components during each exposure, the exposed area is made larger than the original shaped area.

NTIS

Lithography; Patent Applications

20080041632 Northeastern Univ., Boston, MA USA

Tunable Negative Refractive Index Metamaterials and Applications at X and Q-bands

He, Peng; Gao, Jinsheng; Parimi, Pat V; Vittoria, Carmine; Harris, Vincent G; Mar 2, 2008; 19 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-07-1-0136

Report No.(s): AD-A483823; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483823

The goal of the current DARPA-ARO funded project is to design, fabricate, and test a tunable negative index metamterial (TNIM) using ferrites as a constituents material in the frequency range of 36-44 GHz with a targeted center frequency of 50 GHz. During this one year program we successfully accomplished tasks and continued our effort in developing a Q band tunable phase shifter and X band TNIM technology for microwave integrated circuits. This additional effort has lead to the development of microstrip TNIM and a phase shifter in a microstrip form working in X band. The Q band waveguide TNIM and X band microstrip TNIM phase shifters are the first device applications of the ferrite based TNIM. We have demonstrated excellent tunability of both the phase shifters by the application of external magnetic field.

DTIC

Refractivity; Superhigh Frequencies

20080041646 Maui Economic Development Board, Kihei, HI USA

Consortium for Adaptive Optics and Image Post-Processing

Janni, Joseph; Jefferies, Stuart; Jun 12, 2008; 18 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-0347

Report No.(s): AD-A483846; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483846

This was an unusual grant in that it s purpose was to improve ongoing basic research and make it more efficient and effective, rather than to actually sponsor research itself. We are pleased to report that this was being achieved. Activity under this grant is resulting in more effective adaptive optics and image post-processing basic research for the Air Force. In particular, it is enabling cross-organizational communication to a larger extent than had been previously underway, and it has fostered hundreds of interactions that would not have occurred otherwise. It is also strengthening the collegial interchanges and scientific cooperation between Air Force Research Laboratory (AFRL) in-house researchers, on-site contractors, university scientists, and industry (primarily small businesses).

DTIC

Adaptive Optics; Organizations

20080041852 North Carolina State Univ., Raleigh, NC USA

Infrastructure for 3D Imaging Test Bed

Krim, Hamid; May 11, 2007; 11 pp.; In English

Contract(s)/Grant(s): FA9550-06-1-0316

Report No.(s): AD-A484244; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In this report, we describe an experimental test bed we constructed with a variety of sensor modalities for data generation and model validation. Computer generated 3D target models are now routinely used in graphics and computer aided design, and increasingly in computer vision and image processing. This test bed serves primarily three purposes, (1) Data generation or targets for modeling and analysis (2) Emulation of realistic scenarios, (3) Algorithm verification and validation.

DTIC

Image Processing; Imaging Techniques; Target Recognition; Test Stands

20080041874 Massachusetts Inst. of Tech., Cambridge, MA USA

Presidential Early Career Award for Scientists and Engineers

Manalis, Scott R; Jun 2008; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-02-1-0322

Report No.(s): AD-A484307; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Research highlights describing this include: (1) Improving the resolution of scanning probe microscopy in order to enhance the imaging quality of nanostructure materials. In particular, disturbance suppression schemes were implemented with the scanning tunneling microscope (Section I) and with conventional tapping mode (Section II). (2) Development of an

ultrasensitive mass sensor known as the suspended microchannel resonator. As described in Section III, the quality factor (and hence mass resolution) was improved by nearly ten-fold with a wafer-scale vacuum packaging technique that was developed at MIT's Microsystems Technology Laboratory.
DTIC
Engineers; Microscopy; Occupation; Presidential Reports; Resolution; Scientists

20080041915 Rincon Research Corp., Tucson, AZ USA
Ephemeris Determination Using a Connected Element Interferometer
Morrison, D; Pogorelc, S; Celano, T; Gifford, A; Dec 2002; 15 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484460; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This paper describes a connected element interferometer that has been developed and is operating with collection elements in Tucson and Phoenix with a separation of 180 km. Coherence between the collection sites of better than 50 picoseconds is achieved through two-way time transfer over a commercial fiber optics link. The description of hardware and software implementation, as well as measurement results of several operating satellites, are presented. Consider analysis is also presented to demonstrate the projected system performance against different targets, based on the characteristics of the measurement using the existing Tucson-Phoenix link.
DTIC
Ephemerides; Fiber Optics; Interferometers; Interferometry; Satellite Tracking; Transmission Lines

20080042012 Johns Hopkins Univ., Laurel, MD, USA
Thermal-Based Methods for Nondestructive Evaluation
Murphy, J. C., Inventor; Spicer, J. W. M., Inventor; Osiander, R., Inventor; 21 Sep 04; 19 pp.; In English
Contract(s)/Grant(s): N00039-94-C-0001
Patent Info.: Filed Filed 21 Sep 04; US-Patent-Appl-SN-10-945 683
Report No.(s): PB2008-102516; No Copyright; Avail.: CASI: A03, Hardcopy

The use of TRIR as an inspection method in composite manufacture and in embedded-sensor concepts is disclosed. Detection methods using time-resolved microwave thermoreflectometry and time-resolved shearography with TRIR are also disclosed.
NTIS
Infrared Radiometers; Nondestructive Tests; Patent Applications

20080042053 Fastvdo, LLC, Columbia, MD USA
Rate-Adaptive Video Coding (RAVC)
Topiwala, P T; May 2008; 18 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-06-C-0190; Proj-UAVT
Report No.(s): AD-A483152; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483152

The SmartCapture, H.264 technology for off-processor video encoding with Rate-Adaptive Video Coding (RAVC) extensions is state-of-the-art H.264 at the optimum time in the H.264 development cycle for DoD applications such as UAS video. A USB stick embodiment of the technology is described. This SmartCapture device incorporates what probably is the best available commercial H.264 codec ASIC, a small processor, and an NTSC digitizer. This device leveraged commercial development funds and therefore the technology has not yet been optimized for a particular UAS solution. RAVC scales data rate: (1) in the spatial domain, (2) in the temporal domain, (3) in the encoder fidelity domain, and (4) in the group of pictures (GOP) domain. Useful video can be produced from 32 kbps to 4Mbps. In the spatial domain, image resolutions of 720x480 pixels, 640x480, 352x288, 320x240 and 160x120 can be produced. In the temporal domain, possible frame rates are 30, 15, 10, and 5. In the fidelity domain, at standard resolution, typical rates vary from 2.5 Mbps with appreciable transform artifacts at lower rates. GOP varies noise immunity.
DTIC
Coding

20080042069 Air Force Research Lab., Hanscom AFB, MA USA
The Impact of Silicon Photonics
Soref, Richard A; Aug 29, 2007; 3 pp.; In English
Contract(s)/Grant(s): Proj-2305
Report No.(s): AD-A483422; AFRL-RY-HS-TP-2008-0010; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This paper reviews recent world-wide progress in silicon-based photonics-and optoelectronics in order to provide a context for the papers in this special section of the IEICE Transactions. The impact of present and potential applications is discussed.

DTIC
Electro-Optics; Photonics; Silicon

20080042133 National Energy Technology Lab., Morgantown, WV, USA
Development of a Fiber Coupled, End Pumped, Nd:YAG Laser Spark Plug
Woodruff, S. D.; McIntyre, D. L.; Sep. 18, 2007; 23 pp.; In English
Report No.(s): DE2007-915820; DOE/NETL-IR-2007-206; No Copyright; Avail.: National Technical Information Service (NTIS)

No abstract available

Neodymium Lasers; Spark Plugs; YAG Lasers

20080042155 Procopie Cory Hargreaves and Savitch, LLP, San Diego, CA, USA
Device and Method for Inducing Vascular Injury and/or Blockage in an Animal Model
Friedman, B., Inventor; Kleinfeld, D., Inventor; Lyden, P. D., Inventor; Nishimura, N., Inventor; Schaffer, C. B., Inventor; 11 Dec 03; 16 pp.; In English
Contract(s)/Grant(s): R01-NS41096; R01-NS043300-01A1
Patent Info.: Filed Filed 11 Dec 03; US-Patent-Appl-SN-10-538 548
Report No.(s): PB2008-104509; No Copyright; Avail.: CASI: A03, Hardcopy

Ultrashort laser pulses are used to induce photodisruptive breakdown in vasculature in an animal to controllably produce hemorrhage, thrombosis or breach of the blood-brain barrier in individual, specifically-targeted blood vessels. Damage is limited to the targeted vessels such that neighboring vessels exhibit no signs of vascular damage, including vessels directly above and directly below the targeted vessel. Ultrashort laser pulses of lower energy are also used to observe and quantify the baseline and altered states of blood flow. Observation and measurement may be performed by TPLSM, OCT or other known techniques, providing a real-time, in vivo model for the dynamics and effects of vascular injury.

NTIS
Animal Models; Animals; Blocking; Cardiovascular System; Injuries; Patent Applications; Pulsed Lasers

20080042168 Naval Research Lab., Washington, DC USA
Raptor: A Portable Biosensor Upgraded for Reliability and Sensitivity
Anderson, George P; Jul 1, 2003; 9 pp.; In English
Report No.(s): AD-A484003; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484003

The RAPTOR is a commercial, portable (5.6 kg) automated fiber optic biosensor able to detect up to four biological threat agents simultaneously. It performs rapid (5 to 13 minute) fluorescent sandwich immunoassays on the surface of four short polystyrene optical probes. The optical waveguide can be reused up to forty times, or until a positive result is obtained, reducing the logistical burden for field operations. The newest version of the RAPTOR uses the proven reliability of peristaltic pumps for its fluidics, which has greatly increased its mean time to failure. On the biochemical side, the use of Alexa Fluor 647 to label tracer antibodies and immobilization of biotinylated capture antibodies on avidincoated waveguides have improved signal generation by a factor of 5. In combination with improved optics, the new RAPTOR has improved limits of detection by a log order. Recently, we demonstrated the capability of the device to test for eight targets by combining multiple antibodies on each waveguide. These improvements make the RAPTOR ready for use wherever rapid on-site biodetection is required.

DTIC
Bioinstrumentation; Biological Effects; Detection; Fiber Optics; Reliability; Sensitivity

20080042279 Liu and Liu, Los Angeles, CA, USA

Optical Coupling to Data Recording Transducer

Rausch, T., Inventor; Chu, P. B., Inventor; 8 Dec 04; 16 pp.; In English

Contract(s)/Grant(s): NIST-70NANB1H3056

Patent Info.: Filed Filed 8 Dec 04; US-Patent-Appl-SN-11-007 959

Report No.(s): PB2008-104006; No Copyright; Avail.: CASI: A03, Hardcopy

In a recording transducer, radiant energy is incident to be coupled to a recording head via a path defined in the support (e.g., slider) for the head. The radiant energy may be directed via a fiber or lens (e.g., MEMS lens) through a channel defined in the slider. The slider may be keyed to accept the fiber or lens. The process for fabricating the channel in the slider the channel may include wafer level processing to form holes in the slider, to accept the fiber or lens. Wafer level MEM optical processing may be deployed to form integrated MEMS lens structures for an array of sliders.

NTIS

Computer Storage Devices; Data Recording; Data Storage; Optical Coupling; Optical Properties; Patent Applications; Transducers

20080042283 Dunlap, Codding and Rogers, P.C, Oklahoma, OK, USA; Nomadics, Inc., nited States

Manganese Doped Upconversion Luminescence Nanoparticles

Chen, W., Inventor; 11 Aug 05; 40 pp.; In English

Contract(s)/Grant(s): F49620-00-C-0058; DMI-0060254

Patent Info.: Filed Filed 11 Aug 05; US-Patent-Appl-SN-11-202 005

Report No.(s): PB2008-103928; No Copyright; Avail.: CASI: A03, Hardcopy

The present relates in general to upconversion luminescence (UCL) materials and methods of making and using same and more particularly, but not meant to be limiting, to Mn(2+) doped semiconductor nanoparticles for use as UCL materials. The present invention also relates in general to upconversion luminescence including two-photon absorption upconversion, and potential applications using UCL materials, including light emitting diodes, upconversion lasers, infrared detectors, chemical sensors, temperature sensors and biological labels, all of which incorporate a UCL material.

NTIS

Doped Crystals; Luminescence; Manganese; Nanoparticles; Patent Applications

20080042284 Gauthier and Connors, LLP., Boston, MA, USA

Silicon Rich Nitride CMOS-Compatible Light Sources and SI Based Laser Structures

Negro, L. D., Inventor; Yi, J. H., Inventor; Michel, J., Inventor; Kimerling, L. C., Inventor; 25 Apr 05; 11 pp.; In English

Contract(s)/Grant(s): DMR02-13282

Patent Info.: Filed Filed 25 Apr 05; US-Patent-Appl-SN-11-113 542

Report No.(s): PB2008-103927; No Copyright; Avail.: CASI: A03, Hardcopy

A fabrication method produces Si compatible light-emitting materials showing sizeable optical gain by thermally annealing thin film layers of Si-rich nitride (SiNx) By utilizing the Si compatible light-emitting material, light emitting devices can be fabricated that are compatible with CMOS processes. The Si compatible light-emitting material is a high index (refractive index ranging from 1.6 to 2.3) material allowing flexible design of high confinements photonic devices with strong structural stability with respect to annealing treatments. The Si compatible light-emitting material realizes broad band light emission by allowing resonant coupling with rare earth atoms and other infrared emitting quantum dots and better electrical conduction properties with respect to SiO2 systems. The Si compatible light-emitting material also realizes high transparency (low pumping and modal losses) in the visible range.

NTIS

CMOS; Lasers; Light Sources; Patent Applications; Silicon Nitrides

20080042286 Cochran Freund and Yong, LLC, Fort Collins, CO, USA

Increased Laser Output Energy and Average Power at Wavelengths Below 35 NM

Rocca, J. J., Inventor; Alessi, D., Inventor; Luther, B. M., Inventor; Berril, M., Inventor; Larotonda, M. A., Inventor; 23 Dec 04; 11 pp.; In English

Contract(s)/Grant(s): NSF EEC-0310717; NSF ECS-9977677

Patent Info.: Filed Filed 23 Dec 04; US-Patent-Appl-SN-11-021 217
Report No.(s): PB2008-103926; No Copyright; Avail.: CASI: A03, Hardcopy

Saturated tabletop lasers having increased output energy and operating at 5 Hz repetition rate, were demonstrated at wavelengths about 18.9 nm for molybdenum targets, 16.4 nm for ruthenium targets, 14.7 nm for palladium targets, 13.9 nm for silver targets, and 13.2 nm for cadmium targets in transitions of nickel-like ions. The results were obtained using a sequence of two, plasma-generating pre-pulses, each having sub-Joule energy followed after a selected delay period by picosecond laser plasma excitation pulses having with an energy of about 1 J at angles of incidence optimized for maximum energy deposition.

NTIS

Laser Outputs; Lasers; Patent Applications

20080042293 Birch Stewart Kolasch and Birch, Falls Church, VA, USA

Method and Apparatus for Coherently Processing Signals from Incoherent Sources Including Laser Signals

Hopwood, F. W., Inventor; Cole, E. L., Inventor; Glezen, J. H., Inventor; 10 Mar 05; 16 pp.; In English
Contract(s)/Grant(s): F33615-02-C-1257
Patent Info.: Filed Filed 10 Mar 05; US-Patent-Appl-SN-11-076 046
Report No.(s): PB2008-103923; No Copyright; Avail.: CASI: A03, Hardcopy

A stable optical reference oscillator (SORO) consisting of conventional low power CW source of coherent optical radiation having a relatively narrow bandwidth is mixed, i.e., beat against a sample of an incoherent laser transmit signal and the phase of the resultant signal is recorded. This is then compared to the phase of an ideal pulse of a perfect laser transmitter which was previously generated and recorded. The result is a phase correction term which is used in the subsequent signal processing of the received signals to realign the received laser pulses so that they are phase coherent.

NTIS

Lasers; Patent Applications; Signal Processing

75
PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

20080040842 Lawrence Livermore National Lab., Livermore, CA USA

Laser Beam Propagation through Inertial Confinement Fusion Hohlraum Plasmas

Froula, D. H.; Divol, L.; Meezan, N. B.; Dixit, S.; Neumayer, P.; Nov. 02, 2006; 10 pp.; In English
Report No.(s): DE2007-902241; UCRL-CONF-225802; No Copyright; Avail.: National Technical Information Service (NTIS)

A study of the relevant laser-plasma interaction processes has been performed in long-scale length plasmas that emulate the plasma conditions in indirect drive inertial confinement fusion targets. Experiments in this high-temperature (Te = 3.5 keV), dense (ne = 0.5-1OE1021cm-3) hohlraum plasma have demonstrated that blue 351-nm laser beams produce less than 1% total backscatter resulting in transmission greater than 90% for ignition relevant laser intensities (I < 2OE1015Wcm-2). The bulk plasma conditions have been independently characterized using Thomson scattering where the peak electron temperatures are shown to scale with the hohlraum heater beam energy in the range from 2 keV to 3.5 keV. This feature has allowed us to determine the thresholds for both backscattering and filamentation instabilities; the former measured with absolutely calibrated full aperture backscatter and near backscatter diagnostics and the latter with a transmitted beam diagnostics. Comparing the experimental results with detailed gain calculations for the onset of significant laser scattering processes shows that these results are relevant for the outer beams in ignition hohlraum experiments corresponding to a gain threshold for stimulated Brillouin scattering of 15. By increasing the gas fill density in these experiments further accesses inner beam ignition hohlraum conditions. In this case, stimulated Raman scattering dominates the backscattering processes. We show that scattering is small for gains smaller than 20, which can be achieved through proper choice of the laser beam intensity.

NTIS

Hohlraums; Inertial Confinement Fusion; Laser Beams; Plasma Physics; Plasmas (Physics)

20080042059 Air Force Research Lab., Edwards AFB, CA USA

A Zero Dimensional Time-Dependent Model of High-Pressure Ablative Capillary Discharge (Preprint)

Pekker, Leonid; Jun 2008; 19 pp.; In English

Contract(s)/Grant(s): Proj-5026

Report No.(s): AD-A483618; AFRL-RZ-ED-TP-2008-213; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A zero-dimensional time-dependent high-pressure slab capillary discharge model is presented. The model includes a heat transfer radiation model based on a radiation database. This database has been constructed using commercially available radiation software PrismSPEC to calculate the radiation heat flux output from an uniform plasma slab. Thus, unlike earlier models, this model does not use any 'asymptotic' radiation models, but self-consistently calculates the radiation heat flux at the thin transition layer, between the uniform plasma core and the ablative capillary walls. The model includes the thermodynamics of partially ionized plasmas and non-ideal effects taking place in the high density plasma and assumes local thermodynamic equilibrium (LTE), fully dissociated plasma, no heat losses into the capillary walls, a ratio of thermal pressure to magnetic pressure much larger than unity and the existence of a sonic condition at the exit plane (the plasma flow is expected to be chocked at the bore exit). The model predicts the existence of two steady-state regimes of plasma pressure for ablative discharge operation at a given plasma temperature. The first regime occurs when the plasma is so dense that the radiation mean free path is less than the slab gap of capillary, the case of super-high pressure capillary discharge. The second regime occurs when the plasma density is much lower such that radiation mean free path is much larger than the capillary gap, i.e. the case of moderately high plasma pressure. Both regimes converge at small plasma temperature, and there is no steady-state solution for small plasma temperatures. Both regimes, radiation and thermal conduction, may be attractive for thruster applications depending on specific configurations.

DTIC

Ablation; High Pressure; Local Thermodynamic Equilibrium; Plasma Engines; Time Dependence

20080042080 California Univ., Los Angeles, CA, USA

The Pulse Detonation Rocket Induced MHD Ejector (PDRIME) Concept (Preprint)

Cambier, Jean-Luc; Roth, Timothy; Zeineh, Christopher; Karagozian, Ann R; Jun 10, 2008; 23 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-5026

Report No.(s): AD-A483749; AFRL-RZ-ED-TP-2008-215; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Pulse detonation engines (PDEs) have received significant attention due to their potentially superior performance over constant pressure engines. However due to the unsteady chamber pressure, the PDE system will either be over- or under-expanded for the majority of the cycle, with substantial performance loss in atmospheric flight applications. Thrust augmentation, such as PDE-ejector configurations, can potentially alleviate this problem. Here, we study the potential benefits of using Magneto-hydrodynamic (MHD) augmentation by extracting energy from a Pulse Detonation Rocket Engine (PDRE) and applying it to a separate stream. In this PDRE-MHD Ejector (PDRIME) concept, the energy extracted from a generator in the nozzle is applied directly to a by-pass air stream through an MHD accelerator. The air stream is first shocked and raised to high-temperature, allowing thermal ionization to occur after appropriate seeding. The shock-processing of the high-speed air stream is accomplished by using the high initial PDRE nozzle pressures of the under-expanded phase. Thus, energy could be efficiently transferred from one stream to another. The present simulations involve use of a simple blowdown model for PDE behavior, coupled to quasi-1D and 2D numerical simulations of flow and MHD processes in the rest of the PDRIME configuration. Results show potential performance gains but some challenges associated with achieving these gains.

DTIC

Detonation; Detonation Waves; Ejectors; Magnetohydrodynamics; Mathematical Models; Pulse Detonation Engines

76
SOLID-STATE PHYSICS

Includes condensed matter physics, crystallography, and superconductivity. For related information see also *33 Electronics and Electrical Engineering*; and *36 Lasers and Masers*.

20080041238 Harvard Univ., Cambridge, MA USA
Effect of Crystalline Anisotropy on Shock Propagation in Sapphire (Al2O3)
Nellis, W J; Silvera, I F; Jul 26, 2007; 11 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-06-1-0517
Report No.(s): AD-A483437; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The main goal was to find a transparent material stronger than B4C and SiC that remains transparent under shock compression. Sapphire (Al2O3) was chosen because of its high strength and the large body of experimental data that exists to design experiments and interpret results. Published optical images of sapphire under shock indicate heterogeneous yielding and optical emission, which are probably the cause of shock-induced opacity. Heterogeneous deformation is largest for shocks traveling in the c and a directions of the hexagonal lattice; heterogeneous deformation is lower for shocks traveling in the r direction. We used c-cut, r-cut, and m-cut (basal plane) crystals for a systematic study of the mechanism that causes opacity. Shock experiments on these orientations are being performed by Gennady Kanel under a companion grant. His preliminary results suggest microstructural deformations in c-cut crystals do not occur to the same degree in r-cut. Because the least deformation appears to occur in the orientation with the lowest sound speed, we also obtained crystals with seven orientations to identify the direction with lowest sound speed, the optimal direction. These were sent to ARL for sound speed measurements. Orientations with the lowest sound speeds should be studied in future experiments.
DTIC
Aluminum Oxides; Anisotropy; Crystallinity; Sapphire; Shock Waves

20080041343 Naval Research Lab., Washington, DC USA
High-Quality Manganese-Doped ZnSe Nanocrystals
Norris, D J; Yao, Nan; Charnock, F T; Kennedy, T A; Jan 2001; 6 pp.; In English
Report No.(s): AD-A483715; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We demonstrate high-quality, highly fluorescent, ZnSe colloidal nanocrystals (or quantum dots) that are doped with paramagnetic Mn2+ impurities. We present luminescence, magnetic circular dichroism (MCD), and electron paramagnetic resonance (EPR) measurements to confirm that the Mn impurities are embedded inside the nanocrystal. Optical measurements show that by exciting the nanocrystal, efficient emission from Mn is obtained, with a quantum yield of 22% at 295 K and 75% below 50 K (relative to Stilbene 420). MCD spectra reveal an experimental Zeeman splitting in the first excited state that is large (28 meV at 2.5 T), depends on doping concentration, and saturates at modest fields. In the low field limit, the magnitude of the effective g factor is 430 times larger than in undoped nanocrystals. EPR experiments exhibit a six-line spectrum with a hyperfine splitting of 60.4 10-4 cm-1, consistent with Mn substituted at Zn sites in the cubic ZnSe lattice.
DTIC
Doped Crystals; Electron Paramagnetic Resonance; Manganese; Nanocrystals

20080042050 Fermi National Accelerator Lab., Batavia, IL, USA
Exotic Searches at the Tevatron
Brooijmans, G.; Jul. 01, 2007; 6 pp.; In English
Contract(s)/Grant(s): DE-AC02-76CH03000
Report No.(s): DE2007-909888; FERMILAB-CONF-07-346-E; No Copyright; Avail.: National Technical Information Service (NTIS)

Recent results on searches for new physics at Run II of the Tevatron are reported. The searches cover many different nal states and previous hints of signals, but all analyses have at this point led to negative results.
NTIS
Collisions; Particle Accelerators

20080042329 VanDeuren (Reinhart Boerner), Milwaukee, WI, USA
Quantum Dots Tailored with Electronically-Active Polymers
Emrick, T. S., Inventor; Skaff, H., Inventor; Sill, K., Inventor; 8 Aug 05; 17 pp.; In English
Contract(s)/Grant(s): NSF-0239486; DAAD19-01-2-002-P00005
Patent Info.: Filed Filed 8 Aug 05; US-Patent-Appl-SN-11-199 033
Report No.(s): PB2008-104291; No Copyright; Avail.: CASI: A03, Hardcopy

Cadmium selenide, and other quantum dot materials, can be integrated into thin films of poly(para-phenylene vinylene) (PPV) or other polymer compounds without aggregation of the nanocrystals. Solid-state photoluminescence spectra of composite materials prepared by these novel techniques reveal the effect of this greatly enhanced quantum dot-polymer interface relative to cases where the nanoparticles are aggregated, such that electronic communication and energy transfer between the nanoparticle and polymer components is made more efficient.
NTIS
Cadmium Selenides; Patent Applications; Quantum Dots; Thin Films

77
PHYSICS OF ELEMENTARY PARTICLES AND FIELDS

Includes quantum mechanics; theoretical physics; and statistical mechanics. For related information see also *72 Atomic and Molecular Physics, 73 Nuclear Physics*, and *25 Inorganic, Organic and Physical Chemistry*.

20080040819 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA
G0 Backangle Measurements
Kox, S.; Jul. 2007; 4 pp.; In English
Report No.(s): DE2007-918082; Copyright; Avail.: National Technical Information Service (NTIS)

This contribution presents the status, at the time of this conference, of the second phase of the G0 experiment. This experiment is being performed in Hall C at Jefferson Laboratory. It measures PV asymmetries in elastic electron-proton and quasi-elastic electron-deuteron scattering. Details of the experimental setup are given, together with the first data collected in 2006 at backward angles.
NTIS
Compton Effect; Elastic Scattering; Electron Scattering; Neutrons; Protons

20080040820 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA
Results from the Forward G0 Experiment
Real, J. S.; Jun. 2007; 6 pp.; In English
Report No.(s): DE2007-918081; JLAB-PHY-07-709; Copyright; Avail.: National Technical Information Service (NTIS)

The G0 experiment is dedicated to the determination of the strange quark contribution to the electric and magnetic nucleon form factors for a large range of momentum transfers between 0.1 to 1(GeV/c)2 . This information is provided by the asymmetries of cross-sections measured with longitudinally polarized electrons in elastic electron-proton scattering and quasi-elastic electron-deuteron scattering. A set of measurements at two different Q2 will allow the complete separation of the electric and magnetic weak, as well as axial nucleon form factors. This report summarizes the physics case, gives details about the dedicated set-up used, and shows the results of the combination of the strange quark contribution in the electric and magnetic form factors of the protons. The experiment was performed at the Jefferson Laboratory, during years 2003 and 2004, and will be completed after backward-angle measurements in 2006, 2007.
NTIS
Compton Effect; Elastic Scattering; Electron Scattering; Neutrons; Protons

20080040821 College of William and Mary, Williamsburg, VA, USA; Thomas Jefferson National Accelerator Facility, Newport News, VA, USA
Beam Normal Spin Asymmetries: Theory
Vanderhaeghen, M.; Jul. 03, 2007; 7 pp.; In English
Report No.(s): DE2007-918080; JLAB-THY-07-724; Copyright; Avail.: Department of Energy Information Bridge

The beam normal spin asymmetry in elastic electron-nucleon scattering is discussed. This beam normal spin asymmetry depends on the imaginary part of two-photon exchange processes between electron and nucleon, and measures the

non-forward structure functions of the nucleon. After briefly reviewing the theoretical formalism, we discuss calculations in the threshold region, in the resonance region, as well as in the diffractive region, corresponding with high energy and forward angles.
NTIS
Asymmetry; Electron Beams; Electron Scattering

20080041665 Maryland Univ., Baltimore, MD USA
A Relative Entropy-Based Approach to Image Thresholding
Chang, Chein-I; Chen, Kebo; Wang, Jianwei; Althouse, Mark L; Jan 1994; 16 pp.; In English
Report No.(s): AD-A483881; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483881

In this paper, we present a new image thresholding technique which uses the relative entropy (also known as the Kullback-Leiber discrimination distance function) as a criterion of thresholding an image. As a result, a gray level minimizing the relative entropy will be the desired threshold. The proposed relative entropy approach is different from two known entropy-based thresholding techniques, the local entropy and joint entropy methods developed by N. R. Pal and S. K. Pal in the sense that the former is focused on the matching between two images while the latter only emphasized the entropy of the co-occurrence matrix of one image. The experimental results show that these three techniques are image dependent and the local entropy and relative entropy seem to perform better than does the joint entropy. In addition, the relative entropy can complement the local entropy and joint entropy in terms of providing different details which the others cannot. As far as computing saving is concerned, the relative entropy approach also provides the least computational complexity.
DTIC
Entropy; Images

20080041670 Naval Research Lab., Washington, DC USA
Fine Structure Splitting in the Optical Spectra of Single GaAs Quantum Dots
Gammon, D; Snow, E S; Shanabrook, B V; Katzer, D S; Park, D; Apr 15, 1996; 5 pp.; In English
Report No.(s): AD-A483899; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483899

We report a photoluminescence study of excitons localized by interface fluctations in a narrow GaAs/AlGaAs quantum well. This type of structure provides a valuable system for the optical study of quantum dots. By reducing the area of the sample studied down to the optical near-field regime, only a few dots are probed. With resonant excitation we measure the excited-state spectra of single quantum dots. Many of the spectral lines are linearly polarized with a fine structure splitting of 20-50 mueV. These optical properties are consistent with the characteristic asymmetry of the interface fluctuations.
DTIC
Excitons; Fine Structure; Gallium Arsenides; Photoluminescence; Quantum Dots; Quantum Wells; Spectra

20080042039 Air Force Research Lab., Edwards AFB, CA USA
An Efficient Method for Calculating Surface Temperature and Heat Flux Based on Embedded Temperature Sensors (Preprint)
Coy, Edward B; May 9, 2008; 11 pp.; In English
Contract(s)/Grant(s): Proj-5026
Report No.(s): AD-A483561; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Approximate analytical solutions have been obtained for surface temperature and heat flux for the case of two embedded temperature sensors. The solutions have been verified and the range of validity has been established using several methods including comparisons with an exact analytical solution for a linear problem and numerical calculations for a non-linear problem. The performance of the model is presented in both the frequency domain and the time domain. A propagation of error analysis is presented and is used to establish the optimum spacing between the sensors. The solutions place no restrictions on the boundary or initial conditions and rely only on current values of temperature and its rate of change. The temperature dependence of transport properties is accounted for in an approximate way. The method requires minimal computation and is suitable for implementation as a real-time sensor.
DTIC
Detectors; Embedding; Heat Flux; Surface Temperature; Temperature Sensors

20080042066 Air Force Research Lab., Edwards AFB, CA USA
Analytical and Kinetic Modeling of Ablation Process (Preprint)
Pekker, L; Gimelshein, N; Gimelshein, S; May 5, 2008; 15 pp.; In English
Contract(s)/Grant(s): Proj-5026
Report No.(s): AD-A483677; AFRL-RZ-ED-TP-2008-158; No Copyright; Avail.: Defense Technical Information Center (DTIC)

One of the most important issues in CFD modeling of ablation process is the formulation of boundary conditions at the gas-surface interface. These boundary conditions cannot be obtained without analytical or parametric numerical modeling of the Knudsen layer formed near the evaporating surface. Analytical models are therefore of interest for numerical simulation of ablating flows. Recently Pekker, Keidar, and Cambier developed a new analytical model of the Knudsen layer, which takes into account the temperature gradient in the bulk gas. This model uses a bimodal velocity distribution function which preserves the laws of conservation of mass, momentum, and energy within the Knudsen layer and converges to the Chapman-Enskog velocity distribution function at the outer boundary of the Knudsen layer. The main objective of this work is to provide detailed analysis of the applicability of this analytical model of the Knudsen layer through comparison of results with the numerical solutions of the ES-BGK model kinetic equation and DSMC results.
DTIC
Ablation; Gas-Solid Interactions; Mathematical Models; Surface Reactions

80
SOCIAL AND INFORMATION SCIENCES (GENERAL)

Includes general research topics related to sociology; educational programs and curricula. For specific topics in these areas see *categories 81 through 85*.

20080040964 NASA Langley Research Center, Hampton, VA, USA
MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track
Pinelli, Thomas E., Editor; Sullivan, Shannon, Editor; Sanchez, Alicia, Editor; August 2008; 646 pp.; In English; Proceedings of the conference Education and Training Track, 11-13 Sep. 2007, Virginia Beach, VA, USA; See also 20080040965 - 20080040986; CD-ROM contains full text document in PDF format
Contract(s)/Grant(s): WBS 292487.04.07.05
Report No.(s): NASA/CP-2008-215343; L-19498; Copyright; Avail.: CASI: C01, CD-ROM: A99, Hardcopy

This NASA Conference Publication features select papers and PowerPoint presentations from the Education and Training Track of MODSIM World 2007 Conference and Expo. Invited speakers and panelists of national and international renown, representing academia, industry and government, discussed how modeling and simulation (M&S) technology can be used to accelerate learning in the K-16 classroom, especially when using M&S technology as a tool for integrating science, technology, engineering and mathematics (STEM) classes. The presenters also addressed the application ofM&S technology to learning and training outside of the classroom. Specific sub-topics of the presentations included: learning theory; curriculum development; professional development; tools/user applications; implementation/infrastructure/issues; and workforce development. There was a session devoted to student M&S competitions in Virginia too, as well as a poster session.
Author
Education; Models; Simulation; Educational Resources; Learning; Training Devices; Virtual Reality

20080040965 Hampton Univ., VA, USA
Emergency Response Virtual Environment for Safe Schools
Wasfy, Ayman; Walker, Teresa; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 529-539; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

An intelligent emergency response virtual environment (ERVE) that provides emergency first responders, response planners, and managers with situational awareness as well as training and support for safe schools is presented. ERVE incorporates an intelligent agent facility for guiding and assisting the user in the context of the emergency response operations. Response information folders capture key information about the school. The system enables interactive 3D visualization of schools and academic campuses, including the terrain and the buildings' exteriors and interiors in an easy to use Web..based interface. ERVE incorporates live camera and sensors feeds and can be integrated with other simulations such as chemical

plume simulation. The system is integrated with a Geographical Information System (GIS) to enable situational awareness of emergency events and assessment of their effect on schools in a geographic area. ERVE can also be integrated with emergency text messaging notification systems. Using ERVE, it is now possible to address safe schools' emergency management needs with a scaleable, seamlessly integrated and fully interactive intelligent and visually compelling solution.
Author
Emergencies; Situational Awareness; Education; Information Systems; Schools; Virtual Reality; Cameras

20080040966 Virginia Modeling, Analysis and Simulation Center, Suffolk, VA, USA
Modeling, Simulation, and Gaming: Student Capstone Conference
Banks, Catherine; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 555 - 568; In English; See also 20080040964; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Highlights student research and student projects focused on MS&G. Competitive presentations - Volunteer judges from industry, government, military and academic institutions across America. - Evaluate research, presentation expertise, . and ability to answer questions. - Judges also facilitate their assigned conference tracks
Author
Conferences; Students; Education; Research

20080040967 Sandy (Mary), Hampton, VA, USA
FAA Airport Design Competition for Universities
Sandy, Mary; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 569-597; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Raise awareness of the importance of airports to the National Airspace System infrastructure. Increase the involvement of the academic community in addressing airport operations and infrastructure issues and needs. Engage U.S. students in the conceptualization of applications, systems and equipment capable of addressing related challenges in a robust, reliable and comprehensive manner. Encourage U.S. undergraduate and graduate students to contribute innovative ideas and solutions to airport and runway safety issues. Provide the framework and incentives for quality educational experiences for university students. d Develop an awareness of and an interest in airports as a vital and interesting area for engineering and technology careers.
Derived from text
Airports; National Airspace System; Universities; Runways; Competition; Education

20080040968 imagiLEARNING, Inc., Unknown
Using SecondLife Online Virtual World Technology to Introduce Educators to the Digital Culture
Jamison, John; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 257-306; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The rapidly changing culture resulting from new technologies and digital gaming has created an increasing language gap between traditional educators and today's learners (Natkin, 2006; Seely-Brown, 2000). This study seeks to use the online virtual world of SecondLife.com as a tool to introduce educators to this new environment for learning. This study observes the activities and perceptions of a group of educators given unscripted access to this virtual environment. The results 'suggest that although serious technology limitations do currently exist, the potential of this virtual world environment as a learning experience for educators is strong.
Author
Virtual Reality; Digital Systems; Perception; Games; Internets

20080040969 Old Dominion Univ., VA, USA
Know Thy Learner: User Characteristics Underlying Effective Videogame-Based Training
Orvis, Karin A.; Horn, Daniel B.; Belanich, James; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 471-489; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Some proponents of training games argue that younger adults (Soldiers) are part of the 'digital'or 'twitch' generation,

having grown up uing computers and playing videogames (e.g.,Prensky,2001). The Entertainment Software Association (ESA) reports that 69%of American heads of households play computer and/or videogames. '65% of college students reported being regular or occasional game players' (Jones, 2003).
Derived from text
Adults; Students; Games; Computers; Education

20080040970 Old Dominion Univ., VA, USA
A Study of Visualization for Mathematics Education
Daugherty, Sarah C.; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 521-527; In English; See also 20080040964; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Graphical representations such as figures, illustrations, and diagrams play a critical role in mathematics and they are equally important in mathematics education. However, graphical representations in mathematics textbooks are static, Le. they are used to illustrate only a specific example or a limited set. of examples. By using computer software to visualize mathematical principles, virtually there is no limit to the number of specific cases and examples that can be demonstrated. However, we have not seen widespread adoption of visualization software in mathematics education. There are currently a number of software packages that provide visualization of mathematics for research and also software packages specifically developed for mathematics education. We conducted a survey of mathematics visualization software packages, summarized their features and user bases, and analyzed their limitations. In this survey, we focused on evaluating the software packages for their use with mathematical subjects adopted by institutions of secondary education in the USA (middle schools and high schools), including algebra, geometry, trigonometry, and calculus. We found that cost, complexity, and lack of flexibility are the major factors that hinder the widespread use of mathematics visualization software in education.
Author
Applications Programs (Computers); Computer Programs; Mathematics; Education; Algebra; Calculus; Trigonometry

20080040971 Radford Univ., Radford, CA, USA
Handheld Augmented Reality Project [HARP]
Dunleavy, Matt; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 491-519; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The project goal was to design and study engaging and effective augmented reality learning environments using wireless handheld computers equipped with global positioning system (GPS) receivers.
Derived from text
Global Positioning System; Computers; Receivers; Games

20080040972 Deakin Univ., Melbourne, Australia
Cognitive Assessment of Movement-Based Computer Games
Kearney, Paul; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 423-430; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This paper examines the possibility that dance games such as Dance Dance Revolution or StepMania enhance the cognitive abilities that are critical to academic achievement. These games appear to place a high cognitive load on working memory requiring the player to convert a visual signal to a physical movement up to 7 times per second. Players see a pattern of directions displayed on the screen and they memorise these as a dance sequence. Other researchers have found that attention span and memory ability, both cognitive abilities required for academic achievement, are improved through the use of physical movement and exercise. This paper reviews these claims and documents tool development for on-going research by the author.
Author
Mental Performance; Cognition; Visual Signals; Abilities; Games

20080040973 Chandler-Gilbert Community Coll., Chandler, AZ, USA

Playful Physics

Weaver, David; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 309-329; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Effectively communicate qualitative and quantitative information orally and in writing. Explain the application of fundamental physical principles to various physical phenomena. Apply appropriate problem-solving techniques to practical and meaningful problems using graphical, mathematical, and written modeling tools. Work effectively in collaborative groups. Author

Mathematical Models; Physical Factors; Problem Solving; Physics

20080040974 North Carolina State Univ., Raleigh, NC, USA

Educational Gaming: The Importance of Teacher Professional Development

Annetta, Len; Minogue, James; Hudnutt, Bethany; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 331-381; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A04, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Engaging includes: Learn by doing; Learn through failure; New Learning Styles; Perspective taking; Epistemic games; Teacher Buy-In;

Author

Education; Failure; Games; Instructors

20080040975 Virginia Economic Bridge, Radford, VA, USA

The Governor's Challenge: 'Building a Stronger Virginia Today': Transportation Visions and Solutions

Baker, Susan; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 541-553; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Using STM(Science, Technology, Engineering, Math) education, this emerging workforce will have the chance to creatively solve one of Virginia's biggest challenges: TRANSPORTATION. - Students will be asked to develop alternative transportation systems for the state. This competition will enable teams to work with business mentors to design creative solutions for regional gridlocks and develop other transportation systems to more easily and expediently reach all parts of the Commonwealth.

Author

Transportation; Education; Students; Virginia; Competition

20080040976 Oshynee Enterprises, Inc., Gulf Breeze, FL, USA

Tools, Techniques, and Applications: Normalizing the VR Paradigm

Duncan, Gaeme; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 383-422; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Oshynee's precision Learning Objective performance factor rubrics with associated behavioral anchors integrates with Thinking Worlds(TradeMark), to provide event data recording and dynamic prescriptive feedback. Thinking Worlds(TradeMark) provides SCORM parametric data for reporting within the game and within overarching curricula or workplace evaluation strategy. - Open-sourced, browser-based digital dashboard reporting tools collect data from TW, LMS, LCMS, HR, and workplace metrics or control systems The games may be delivered across the internet or in a range of networked and stand-alone methods using the delivery model (s) required by the host organization.

Derived from text

Data Recording; Education; Games

20080040977 Tidewater Community Coll., Portsmouth, VA, USA

Modeling and Simulation at Tidewater Community College

Summers, Michael; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and

Training Track; August 2008, pp. 611-633; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Investment of $1.5 million in medical simulation technology. Integration of medical simulation activities into the curriculum. Support from TCC leadership. Individual and team activities. Skill development and critical thinking/problem solving skills.

Derived from text

Education; Systems Simulation; Problem Solving; Biotechnology; Medical Equipment; Leadership

20080040978 Christopher Newport Univ., Newport News, VA, USA

NASA Student Competitions

Ward, Elizabeth B.; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 599-609; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Topics covered include: I. Aeronautics Contest: a) High school and college students; b) Participation based on academic calendar; c) Vehicles and Systems; d) High School Division 2007 Highlights: 1) Top score for international teams..... girls from South Africa; 2) Top scores overall for individuals..... US and International were girls; f) Participating Countries: South Africa, India, Pakistan, Romania, Canada. II. Life and Work on the Moon: What images come to mind. a) Architecture; b) Industrial design; c) Computer Design; d) Fine arts. III. Next Generation Moon Buggy Contest: a) High School and College students; b) Real vehicles; c) Real missions.

Derived from text

Students; Competition; Computer Design; Arts; Schools

20080040979 FH Joanneum Univ. of Applied Sciences, Graz, Austria

Play and Learn: Potentials of Game-Based Learning

Pivec, Maja; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 103-175; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A04, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Learners are encouraged to combine knowledge from different areas to choose a solution or to make a decision at acertain point. Learners can test how the outcome of the game changes based on their decisions and actions. Learners are encouraged to contact other team members and discuss and negotiate subsequent steps, thus improving their social skills.

Derived from text

Education; Game Theory; Cognition; Virtual Reality; Data Mining

20080040980 Curtin Univ. of Technology, Perth, Australia

The School of Virtual Knocks: Learning from Doing--Without Pain of Mistakes

Darby, Michael; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 177-201; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The present day educational process, as currently practiced, is no longer necessarily synonymous with learning, and the concept of learning is becoming disassociated with knowledge acquisition. True, learning is not accidental, nor is the absence of learning normally by choice. It is the result, intended or otherwise, of decisions made by government, researchers, educators, students, parents, and the wider community. It is underpinned by the quality of teaching, the relevancy of the instruction to the student's world, and the perseverance of the student's desire to learn. It is these choices that are driving the wedge between teaching and learning. The learning outcomes are derived by curriculum developers, educational psychologists, government and industry.Yet as advances in understanding how students learn have been made, the advances in technology, specifically models and simulation, which are able to underpin complex knowledge domains, have been left behind if not ignored. While a majority of stakeholders in education agree that the current educational environment is missing the mark, it is important to underpin those impressions with a basis of knowledge. This paper reviews education in order to foster the conclusion that education must change and that the enabling methodologies and technologies already exist in the form of models and simulation.

Author

Education; Simulation; Models; Selection; Students

20080040981 Harvard Univ., MA, USA

Immersive Collaboration Simulations: Multi-User Virtual Environments and Augmented Realities

Dede, Chris; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 3-43; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Emerging information technologies are reshaping the following: shifts in the knowledge and skills society values, development of new methods of teaching and learning, and changes in the characteristics of learning.

Derived from text

Education; Virtual Reality; Educational Resources; Information Transfer

20080040982 IPN Foundation, Netherlands

'To Boldly Go...' Building a Virtual Classroom

vandeVen, Ryan W.; Meurders, Mary F. E.; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 225-245; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The concept of a Exploration-Based Learning Environment has recently been introduced into the argument that technology can put students back into the field of real learning. IPN has set foot there, where no school has gone before, by actually building a Virtual Classroom.This paper is about our first step towards the Virtual Classroom: Experience-Based Learning by simulations. A field study on the processes involved when going from a regular educational setting to using simulations as part of the educational was done. We discuss eventual pitfalls and the role changes in education for both teacher and pupil, the importance of understanding the psychological process that the pupil goes through and the consequences this has for the guiding staff. Changes are not only necessary to keep up with the change but also to break through the vicious circle of what we call the trend of 'Spectacle and Boredom' in education.

Author

Education; Pupils; Instructors; Simulation

20080040983 Alchesay High School, Whiteriver, AZ, USA

Population Simulation, AKA: Grahz, Rahbitz and Fawkzes

Bangert, Tyler R.; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 247-256; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

In an effort to give students a more visceral experience of science and instill a deeper working knowledge of concepts, activities that utilize hands-on, laboratory and simulated experiences are recommended because these activities have a greater impact on student learning, especially for Native American students. Because it is not usually feasible to take large and/or multiple classes of high school science students into the field to count numbers of organisms of a particular species, especially over a long period of time and covering a large area of an environment, the population simulation presented in this paper was created to aid students in understanding population dynamics by working with a simulated environment, which can be done in the classroom. Students create an environment and populate the environment with imaginary species. Then, using a sequence of 'rules' that allow organisms to eat, reproduce, move and age, students see how the population of a species changes over time. In particular, students practice collecting data, summarizing information, plotting graphs, and interpreting graphs for such information as carrying capacity, predator prey relationships, and how specific species factors impact population and the environment. Students draw conclusions from their results and suggest further research, which may involve changes in simulation parameters, prediction of outcomes, and testing predictions. The population Simulation has demonstrated success in the above student activities using a 'board game' version of the population simulation. A computer version of the population simulation needs more testing, but preliminary runs are promising. A second - and more complicated - computer simulation will simulate the same things and will add simulated population genetics.

Author

Environment Simulation; Computerized Simulation; Graphs (Charts); Simulation; Students; Data Acquisition

20080040984 Carnegie-Mellon Univ., Pittsburgh, PA, USA
Simulated Students and Classroom Use of Model-Based Intelligent Tutoring
Koedinger, Kenneth R.; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 45-101; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A04, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Two educational uses of models and simulations: 1) Students create models and use simulations ; and 2) Researchers create models of learners to guide development of reliably effective materials. Cognitive tutors simulate and support tutoring - data is crucial to create effective model. Pittsburgh Science of Learning Center: Resources for modeling, authoring, experimentation. Repository of data and theory. Examples of advanced modeling efforts: SimStudent learns rule-based model. Help-seeking model: Tutors metacognition. Scooter uses machine learning detectors of student engagement.
Derived from text
Education; Simulation; Students

20080040985 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Game-Based Learning Theory
Laughlin, Daniel; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 203-224; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Persistent Immersive Synthetic Environments (PISE) are not just connection points, they are meeting places. They are the new public squares, village centers, malt shops, malls and pubs all rolled into one. They come with a sense of ‘thereness’ that engages the mind like a real place does. Learning starts as a real code. The code defines ‘objects.’ The objects exist in computer space, known as the ‘grid.’ The objects and space combine to create a ‘place.’ A ‘world’ is created, Before long, the grid and code becomes obscure, and the ‘world maintains focus.
Derived from text
Game Theory; Learning Theory; Virtual Reality

20080040986 Norfolk State Univ., VA, USA
Game Development for Engineering Education
Morsi, Rasha; MODSIM World 2007 Conference and Expo: Select Papers and Presentations from the Education and Training Track; August 2008, pp. 431-469; In English; See also 20080040964; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Game Development (Process); Game Development Tools; Implementation Tools; Materials Education Game Environment; Virtual Cleanroom; E-learning as game-like environments + CLDT; +CPR Tool.
Derived from text
Education; Games; Product Development; Engineering

20080041588 NASA Dryden Flight Research Center, Edwards, CA, USA
Rachael Humberg Exit Presentation
Humberg, Rachael; September 25, 2008; 24 pp.; In English; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041588

This viewgraph presentation reviews the experiences of a college student during a summer internship. The student involved in many projects, such as Stratospheric Observatory for Infrared Astronomy (SOFIA), Acoustic Equipment Testing, Acoustic Test planing for the X-48B and Ikhana.
CASI
Students; Universities; Education; University Program

81
ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

20080040867 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Workforce Challenges and Retention Success Stories
Donohue, John T.; March 2008; 8 pp.; In English; IEEE Aerospace Conference: Developing the 21st Century Space Engineering Workforce, 1-8 Mar. 2008, Big Sky, MT, USA; Original contains color illustrations; No Copyright; Avail.:
CASI: A02, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080040867

This viewgraph document discusses the current and future challenges in building and retaining the required workforce of scientist and engineers for NASA. Specifically, the talk reviews the current situation at the Goddard Space Flight Center in Greenbelt, Maryland. Several programs at NASA for high school and college students to assist in inspiring the next generation of scientist and engineers are reviewed. The issue of retention of the best of the young scientists and engineers is also reviewed, with a brief review of several young engineers and their success with and for NASA.
CASI
Engineers; Scientists; Personnel; Human Resources; Management Planning; Personnel Development; Personnel Management

20080040868 NASA Goddard Space Flight Center, Greenbelt, MD, USA
For the Sake of Our Future: Nurturing and Sustaining a Healthy-Leader-Follower Dynamic
Williams, Gail S.; February 24, 2006; 16 pp.; In English; The Rethinking Followership: New Paradigms, Perspectives, and Practices Conference, 24 - 25 Feb. 2008, Claremont, California, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080040868

This viewgraph presentation reviews some of the issues that are impacting NASA and discusses ways to improve the organizational culture in the agency.
CASI
Leadership; Morale; Motivation; Psychology

20080041443 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Knowledge, People, and Risk
Rogers, Edward W.; April 14, 2008; 10 pp.; In English; National Contract Management Association conference, 14-17 Apr. 2008, Cincinnati, OH, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy

NASA's mandate is to take risks to got into space while applying its best knowledge. NASA's knowledge is the result of scientific insights from research, engineering wisdom from experience, project management skills, safety and team consciousness and institutional support and collaboration. This presentation highlights NASA's organizational knowledge, communication and growth efforts.
Derived from text
NASA Programs; Knowledge; Industrial Management; Communication; Personnel Management

20080041515 NASA Dryden Flight Research Center, Edwards, CA, USA
Staying Motivated During Tough Times
Cole, Jennifer H.; [2008]; 4 pp.; In English; No Copyright; Avail.: CASI: A01, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041515

This paper describes the problem of team motivation on a project. Our team was working with the Department of Homeland Security (DHS). The task consisted of figuring out how to safely control and land an airliner using just the thrust from the engines. This is called Throttles-Only Control (TOC). We weren't allowed to modify the airliner in any way, given the time and cost involved, and we had to use a stock airliner with line pilots. The idea was to give the pilots an emergency checklist which would provide them with the most useful information in the shortest time to learn how to fly TOC. The DHS

Program office that was supporting us had its funding redirected, due to new priorities. The process of staying motivated for finishing as much of the project as possible is described.
Derived from text
Motivation; Morale; Teams

20080042427 NASA Marshall Space Flight Center, Huntsville, AL, USA
NASA's Agency-wide Strategy for Environmental Regulatory Risk Analysis and Communication
Duda, Kristen; Scroggins. Sharon; June 24, 2008; 1 pp.; In English; Air and Waste Management Annual Conference, 24-27 Jun. 2008, Portland, OR, USA; Copyright; Avail.: Other Sources; Abstract Only

NASA's mission is to pioneer the future in space exploration, scientific discovery, and aeronautics research. To help enable existing and future programs to pursue this mission, NASA has established the Principal Center for Regulatory Risk Analysis and Communication (RRAC PC) to proactively identify, analyze, and communicate environmental regulatory risks to the NASA community. The RRAC PC is chartered to evaluate the risks posed to NASA Programs and facilities by environmentally related drivers. The RRAC PC focuses on emerging environmental regulations, as well as risks related to operational changes that can trigger existing environmental requirements. Changing regulations have the potential to directly affect program activities. For example, regulatory changes can restrict certain activities or operations by mandating changes in how operations may be done or limiting where or how certain operations can take place. Regulatory changes also can directly affect the ability to use certain materials by mandating a production phase-out or restricting usage aPi'iications of certain materials. Such changes can result in NASA undertaking material replacement efforts. Even if a regulation does not directly affect NASA operations, U.S. and international regulations can pose program risks indirectly through requirements levied on manufacturers and vendors of components and materials. For example, manufacturers can change their formulations to comply with new regulatory requirements. Such changes can require time-consuming and costly requalification certification for use in human spaceflight programs. The RRAC PC has implemented several strategies for proactively managing regulatory change to minimize potential adverse impacts to NASA Programs and facilities. This presentation highlights the lessons learned through establishing the RRAC PC, the process by which the RRAC PC monitors and distributes information about emerging regulatory requirements, and the cross-Agency cooperation that is vital to supporting NASA's mission.
Author
NASA Programs; Regulations; Risk Assessment; Environment Management

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DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography. For computer program documentation see *61 Computer Programming and Software*.

20080040956 Hokkaido Univ. of Education, Iwamizawa, Japan
Meaning of 'Individuals Diversity' for Information-System-Design-as-Organization-Design, and Significance of 'Web-based' as Design Solution
Miyashita, Hideaki; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 12 pp.; In English; See also 20080040944; Original contains color illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

As to information system, 'if we build it, they will come' does not work. Its result is wasting money. But, in reality, it is being repeated. The point of the problem is that the methodology of design is seriously lacked there. Information system design is much more than information system design. It is an organization design -- design of organization shift. It is to conform the information system and the members diversity to each other. And the point is the activation/release of individuals diversity, because (1) individuals diversity is the moment of organization shift and (2) activating/releasing individuals diversity is the manner of organizational well-being . The web-based is a potent means/solution for activating/releasing individuals diversity. It should be asserted because we are still far from using the most of the power of web-based .
Author
Information Systems; Systems Engineering; World Wide Web; Organizations; Human Factors Engineering

20080040959 IPSI Belgrade, Belgrade, Serbia

Bitmap Indexing of XML Data

Alom, B. M.; Hoque, A. S. M.; Islam, Saiful; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 11 pp.; In English; See also 20080040944; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Indexing schemes for semi-structured data have been developed in recent years to optimize path query processing by summarizing path information. Existing methods in three-dimensional bitmap indexing of XML data require large space. At the same time, querying of large XML documents database is difficult. To overcome these limitations, we have developed an indexing scheme of XML data using a two-dimensional Bitmap, providing the facility to store element-path, token and documents in a two dimensional matrix. This system contains two dictionaries; one is element-path dictionary having all the distinct element paths for all XML documents and another token dictionary containing token values for the distinct words. This indexing scheme creates a token-path-document matrix; showing the existence of XML data in specific document and in appropriate path. In this paper we present how XML data, its path and document can be stored in a two dimensional bitmap and describe its performance over three dimension.

Author

Document Markup Languages; Indexing (Information Science); Indexes (Documentation); Information Retrieval

20080040962 Electronics and Telecommunications Research Inst., Daejon, Korea, Republic of

A Study on the Multiple Packaging Techniques for Digital Rights

Kim, Junil; Jeong, Yeonjeong; Yoon, Ki-Song; International Conference on Advances in the Internet, Processing, Systems, and Interdisciplinary Research (IPSI-2005 Montenegro); 2005; 7 pp.; In English; See also 20080040944; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This paper presents multiple packaging techniques for digital rights management of discrete media. Discrete media is a format for download media and stored in any file format. We design multiple packaging system of discrete media for digital rights management based on MPEG-21 DID(Digital Item Declare). We design two kinds of multiple packaging techniques which multipart packaging or composite packaging. We will present example to use each packaged contents.

Author

Copyrights; Documents; Multimedia; Multiple Access; Information Dissemination; Document Markup Languages

20080041109 Naval Air Warfare Center, Patuxent River, MD USA

Special Operations Reconnaissance (SOR) Scenario: Intelligence Analysis and Mission Planning

Warner, Norman; Burkman, Lisa; Biron, H C; Apr 15, 2008; 82 pp.; In English

Report No.(s): AD-A483249; NAWCADPAX/TM-2007/184; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483249

The purpose of this document is to present the Special Operations Reconnaissance (SOR) scenario and the methodology used to generate and validate the scenario. The face of military team collaboration has changed due to gathering intelligence from broader and more diverse sources. As information sources become more complex, knowledge uncertainty increases. The internet has also provided greater communication opportunities, and military teams must be able to collaborate effectively in asynchronous situations. Collaboration tools must continue to evolve to keep up with this increasing complexity in communication. In order to assist in this evolution, a deeper understanding of team collaboration must be achieved. During team collaboration, there are many higher order cognitive processes that are both inside and outside the head of team members - these processes are known as macrocognitive processes. Since it is not possible to see what a person is thinking internally, the person's behavior must be studied in a controlled, rich environment. Ideally, this environment should be rich and emulate a real-world team collaboration problem. With the input of several military personnel with experience in intelligence analysis and mission planning, the SOR scenario was developed to serve as this environment. The scenario is intended to be realistic and complex, but should elicit information about the internal and external aspects of the macrocognitive processes. The SOR scenario is an intelligence analysis and mission planning scenario that requires a team of three participants to work together to solve various problems in an asynchronous- distributed environment. This scenario will help to deepen the understanding of team collaboration, team problem solving, and macrocognition, which will aid in the development of more effective team collaboration tools.

DTIC

Information Systems; Intelligence; Mission Planning; Reconnaissance

20080041261 Naval Postgraduate School, Monterey, CA USA

An Operational Statistical Analysis of USA Marine Corps Civilian Employee Injury Tracking Process and Injury Data

Rascon, Carlos G; Jun 2008; 101 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483495; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Organizations within the Department of Defense (DoD) and Department of Labor (DoL) report safety metrics that quantify DoD civilian employee injury incident rates and lost work time for all military services. Based on these metrics, the USA Marine Corps (USMC) is experiencing high injury rates and lost work time in relation to adjacent services. This thesis recommends process improvements for tracking injuries and handling data, as well as a time series prediction methodology for investigating the causes of injuries (e.g., slips trips and falls, manual handling of equipment) and the types of injuries (e.g., back conditions, burns, bruises) that may assist the USMC in focusing its safety plans and efforts and reducing civilian employee injury rates.

DTIC

Data Management; Data Processing; Injuries; Personnel; Statistical Analysis; Time Series Analysis; United States

20080041263 Naval Postgraduate School, Monterey, CA USA

An Analysis of the Relationship of Military Affiliation to Demographics, New Sailor Survey Responses, and Boot Camp Success

Pond, Eric L; Jun 2008; 163 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483498; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This study examines the relationship of military affiliation to demographics, New Sailor Survey responses administered during fiscal year 2007, and graduation from boot camp. A recruit was categorized as having military affiliation if parents or siblings of the recruit had served or were serving in the military. Recruits' military affiliation showed no significant relationship with AFQT scores, age, bonus amounts, college level, graduation rate from boot camp, number of dependents, boot camp pay grade, race, single status, or the quarter in which the recruit went to boot camp. There was a relationship between military affiliation and a recruit's being female, Hispanic, or not a U.S. citizen. In general, military affiliation did not have an unexplainable significant effect on responses to the New Sailor Survey. The survey responses as a whole suggest that military affiliation does have an effect on how recruits respond; however, further data collection and analysis is necessary beyond the 2,101 data points in this study. The logistic model showed that bonuses above $15,000 and being male were positive predictors of graduation from boot camp. Furthermore, the more a recruit felt prepared by his or her recruiter, the more likely he or she would graduate from boot camp.

DTIC

Demography; Military Personnel; Surveys

20080041273 Office of the President, Argentina

Challenges to the Design of New Detection Devices

Espona, Maria Jose; Jul 1, 2003; 6 pp.; In English

Report No.(s): AD-A483520; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Like in a DNA double helix, the progress in the capacity to design detection devices runs parallel with the advances in the creation of genetically modified microorganisms. The links of these two spirals is constituted by the extensive and freely available information on the new detectors development and research and experimentation with microorganisms. In a near future, this phenomenon could lead to a race between detection devices designers and proliferators or terrorist groups that may access to the information and technology required to counter them. This paper highlights the relevance of protecting critical know-how and intangible technology in order to deter or limit the capacity of proliferators in the biological arena.

DTIC

Detection; Security

20080041281 Naval Postgraduate School, Monterey, CA USA

Exploring Data Sharing Between Geographically Distributed Mobile and Fixed Nodes Supporting Extended Maritime Interdiction Operations (EMIO)

Mercado, Albert; Jun 2008; 127 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483543; No Copyright; Avail.: Defense Technical Information Center (DTIC)

After the 9/11 catastrophe, insurgents and terrorists have shown us that they will continue to employ asymmetric threats to carry out their objectives, by using any available equipment or any available route to their objective that remains unchecked

or unchallenged, like car bombs, suicide bombers, and commercial airplanes. In response, the USA and its allies are focusing harder on data sharing efforts in order to improve the situational awareness (SA) of command and control (C2) structures, to make quicker decisions, and to collaborate with remote experts on chemical, biological, and radiological elements, biometrics, or explosive devices. This thesis discusses the data sharing contributions and features of collaborative tools used onboard a boarding vessel in a riverine area and participating nodes to provide or to enhance the SA and decision making process during EMIOs. As maritime operational experiments, conducted by the Center for Network Innovation and Experimentation (CENETIX), are more successful with each successive MIO experiment, a better understanding for methods of sharing substantial data captured during these operations with participating nodes will be reached.
DTIC
Command and Control; Regions; Rivers; Situational Awareness

20080041295 Library of Congress, Washington, DC USA
Protection of Classified Information by Congress: Practices and Proposals
Kaiser, Frederick M; May 27, 2008; 7 pp.; In English
Report No.(s): AD-A483582; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The protection of classified national security and other controlled information is of concern not only to the executive branch which determines what information is to be safeguarded, for the most part1 but also to Congress, which uses the information to fulfill its constitutional responsibilities. It has established mechanisms to safeguard controlled information in its custody, although these arrangements have varied over time between the two chambers and among panels in each. Both chambers, for instance, have created offices of security to consolidate relevant responsibilities, although these were established two decades apart. Other differences exist at the committee level. Proposals for change, some of which are controversial, usually seek to set uniform standards or heighten requirements for access. This report will be updated as conditions require.
DTIC
Procedures; Protection; Protectors; Security

20080041351 Naval Postgraduate School, Monterey, CA USA
Revisiting Organizations as Information Processors: Organizational Structure as a Predictor of Noise Filtering
Fournier, Kevin L; Jun 2008; 69 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483732; No Copyright; Avail.: Defense Technical Information Center (DTIC)

By comparing the information processing behaviors of four groups of mid-level working professionals as each undertakes a series of four complex, interdependent, computer-mediated decision-making exercises, this thesis explores: (1) how processing of information in effective [i.e., high-performing] groups differs from the processing of information in ineffective [i.e., low-performing] groups, and (2) the characteristics of adaptation, from an information processing perspective, within high performing groups. The results of the exploration, though mostly inconclusive, call into question both intuition and literature regarding organizational structure as well as literature in information and knowledge sharing. It is predicted that meaningless (noise) information will be shared less as time passes and individuals learn. It is also hypothesized that as less noise is shared the organizations' performance will increase. As an explanation, this thesis proposes that the ability to filter noise not only increases over time, but is also dependent on the organizational structure further explaining why one structure consistently outperforms another organizational structure. Further experimentation is needed to test the validity of these conjectures and bring better understanding to Organizational Theory, Information Processing and Knowledge Sharing networks.
DTIC
Data Processing; Human Performance; Organizations; Teams

20080041353 Naval Postgraduate School, Monterey, CA USA
Exploring the Importance of Information Superiority to the Decision Maker
Jackson, III, John B; Jun 2008; 83 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483736; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The importance of information superiority has been emphasized as a critical capability that future joint forces must be able to achieve. No longer simply a future concept, it is being officially defined and incorporated in doctrinal publications like Joint Publication 3-13, 'Information Operations.' Unfortunately, our ability to effectively measure its contribution relative to other battlefield systems remains limited. This research focuses on exploring the limits of the contributions that information superiority can make, examining the sensitivity of information superiority to varying information quality, and comparing those

contributions with other contributing factors to battlefield results. Furthermore, an effort is made to identify some of the risks associated with using information superiority as a force multiplier. A simple decision model was developed, based on the concepts of a two-person zero sum game, to explore these questions. In the model, one side is provided varying degrees of an information advantage, while also varying degrees of information quality to the information advantage. Additionally, a variety of scenarios were considered involving varied levels of opposing side force levels. Experimental design techniques were employed to efficiently explore the model output space, while allowing for sufficient replications of the model at each design point, in order to provide a sufficient data set for analysis.
DTIC
Decision Making; Game Theory; Warfare

20080041357 Naval Postgraduate School, Monterey, CA USA
Exploring and Validating Data Mining Algorithms for Use in Data Ascription
Huynh, Daniel P; Jun 2008; 77 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483756; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Digital forensics is a growing and important field of research for current intelligence, law enforcement, and military organizations today. As more information is stored in digital form, the need and ability to analyze and process this information for relevant evidence has grown in complexity. Today analysis is reliant upon trained experts. This, compounded with the sheer volume of evidence obtained from the field, means that analysis frequently takes too long. Current forensic tools focus on decoding and visualization and not data reduction or correlation. This thesis fills an important void. The first goal is to determine whether it is possible to use file metadata accurately to ascribe ownership of files based upon a hard drive with multiple users. The second is to explore and validate existing algorithms that may support and aid data ascription. The last goal of this work is to compare and measure the accuracy of these algorithms. This work facilitates further research into developing an automated analysis and reporting framework for media exploitation in computer forensics.
DTIC
Algorithms; Data Mining; Information Retrieval

20080041476 Office of the Director of National Intelligence, Washington, DC USA
National Counterterrorism Center: 2007 Report on Terrorism
Apr 30, 2008; 101 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483436; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483436

Consistent with its statutory mission to serve as the U.S. Government's knowledge bank on international terrorism, the National Counterterrorism Center (NCTC) is providing this report and statistical information to assist in understanding the data. Section 2656f(b) of Title 22 of the U.S. Code requires the State Department to include in its annual report on terrorism 'to the extent practicable, complete statistical information on the number of individuals ... killed, injured, or kidnapped by each terrorist group during the preceding calendar year.' While NCTC keeps statistics on the annual number of incidents of 'terrorism,' its ability to track the specific groups responsible for each attack involving killings, kidnappings, and injuries is limited by the availability of reliable open source information, particularly for events involving small numbers of casualties. The statistical material compiled in this report, therefore, is drawn from the number of attacks of 'terrorism' that occurred in 2007, which is the closest figure that is practicable for NCTC to supply in satisfaction of the above-referenced statistical requirements. In deriving its figures for terror attacks, NCTC applies the definition of 'terrorism' that appears in the 22 U.S.C. 2656f(d)(2), i.e., 'premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agents.' To establish the repository for the U.S. Government's database on terror attacks, in 2005 NCTC unveiled the Worldwide Incidents Tracking System (WITS). Available on the Internet, WITS allows public access to and a transparent look at the NCTC data. NCTC cautions against placing too much weight on any set of attack data alone to gauge success or failure against the forces of terrorism. Despite limitations, tracking attacks can help us understand some important trends, including the geographic distribution of incidents and information about the perpetrators and their victims.
DTIC
Data Bases; Terrorism

20080041587 NASA Stennis Space Center, Stennis Space Center, MS, USA
Thinking About Taking The Leap? Hear From Those Who Did So...and Survived A Case Study: NASA Stennis Space Center Electronic Records Management
Albasini, Colby V.; September 09, 2008; 22 pp.; In English; National Archives and Records Administration RACO08, 9 Sep. 2008, Atlanta, GA, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): NNS04AB54T
Report No.(s): SSTI-2220-0168; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041587

Increased visibility into records management: a) Partnered with NARA to provide electronic records management and Emergency Response training; b) Mandate all civil servants and records personnel attend training.Improve Disaster Recovery: a) TechDoc considered a vital system; b) All electronic documentation and records managed by our system available offsite. Author
Records Management; Education; Emergencies; Disasters; Personnel

20080041606 RAND Corp., Santa Monica, CA USA
The Psychological Implications of Media-Covered Terrorism
Jenkins, Brian M; Jun 1981; 14 pp.; In English
Report No.(s): AD-A483724; RAND-P-6627; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483724

In the age of mass communications, the role of the news media cannot be separated from acts of terrorism. To talk about the psychological effects of terrorism is to talk about the psychological effects of terrorism as reported by the news media. Terrorism is aimed at the people watching. By carrying out inherently dramatic, deliberately shocking acts of violence, terrorists hope to attract attention to their causes and project themselves as forces to be reckoned with. To reach their audience terrorists depend on the news media. This sometimes puts the news media in the uncomfortable role of appearing to be an accomplice to the terrorist and has led to allegations that by their reporting the media exaggerate the problem of terrorism, spread alarm and provoke overreaction, aggrandize and romanticize the terrorists, even bestow a degree of legitimacy upon them, and inspire others to become terrorists. A closer examination of these assertions shows some of them to be at least partially correct. But some surprises also appear. Do the news media provide too much coverage of terrorism and thereby exaggerate its significance? By giving incidents of terrorism enormous coverage, do the news media encourage acts of terrorism? This paper discusses these issues and the psychological effects of media coverage of terrorist incidents on the public.
DTIC
News Media; Terrorism

20080041609 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
A Cocitation Analysis of Crisis Management Literature
Yesue, Elizabeth A; Mar 2008; 139 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483745; AFIT/GEM/ENV/08-M01; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483745

This thesis addresses the need for a structured mapping of academic literature relating to crisis management. An overview of current crisis management literature is provided, highlighting the gap and concentrating on predominant themes that have been identified in previous reviews, as well as those extracted from influential works. A review of bibliometric methodology is highlighted to address the gap. Research goals are named and the phased methodology necessary to meet those goals is outlined and followed. Results are covered in detail: The resultant factor analysis and multidimensional scaling confirm previous efforts to taxonomize the literature, further reinforcing the call to mature the field of crisis management literature.
DTIC
Emergencies; Management Methods; Surveys

20080041615 RAND Corp., Santa Monica, CA USA
The Media and Intra-Elite Communication in Poland: Summary Report
Curry, Jane L; Johnson, A R; Dec 1980; 64 pp.; In English
Report No.(s): AD-A483780; RAND-R-2627; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483780

The Rand Corporation is conducting a multiyear comparative study of the role of the media in intra-elite communication

in Communist countries. Western analysts of the political process in 'closed' Communist systems necessarily rely heavily on the published and broadcast output of the mass and specialized media. These media are in part propaganda organs, but they also have other functions. A generation of Sovietologists (and specialists on other Communist states) has had to base much of its analysis of policies and politics on interpretations of media nuances. Yet the assumptions of Sovietologists about the relationship between the media and the political actors whose behavior or attitudes are inferred from them have received little attention. The Rand study was initiated to fill this need. Its emphasis is not on techniques of content analysis, but rather on the process by which politically significant material appears in Communist-country media. The principal data base of the study is information obtained from extended interviews with 44 emigres formerly involved in the media process as writers, journalists, editors, censors, and government and Party officials. The Rand project utilizes this data base to examine the structure and process of Communist media; the study focuses on the medium in the expectation that this will enhance the analyst's ability to interpret its message. The results of this work on Polish media are published in the present report, which provides an overview analysis and conclusions, and in a series of Rand Notes, which contain more detailed analyses and documentation of the research. This report summarizes the major features of the Polish media system, describes the specific roles and editorial processes of major types of media, and analyzes the relationship between divergences of view that appear in the media and intra-elite discussion, debate, and controversy.
DTIC
News Media; Poland

20080041616 RAND Corp., Santa Monica, CA USA
The Media and Intra-Elite Communication in Poland: Organization and Control of the Media
Curry, Jane L; Dec 1980; 110 pp.; In English
Report No.(s): AD-A483781; RAND-N-1514/1; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483781

The Rand Corporation is conducting a multiyear comparative study of the role of the media in intra-elite communication in Communist countries. Western analysts of the political process in 'closed' Communist systems necessarily rely heavily on the published and broadcast output of the mass and specialized media. These media are in part propaganda organs, but they also have other functions. A generation of Sovietologists has had to base much of its analysis of policies and politics on interpretations of media nuances. Yet their assumptions about the relationship between the media and the political actors whose behavior or attitudes are inferred from them have received little attention. The Rand study was initiated to fill this need. Its emphasis is not on techniques of content analysis, but rather on the process by which politically significant material appears in Communist-country media. The principal data base of the study is information obtained from interviews with 44 emigres formerly involved in the media process as writers, journalists, editors, censors, and government and Party officials. The results of this study are published in a Summary Report, which provides an overview and conclusions, and in a series of Rand Notes, which contain more detailed analyses and documentation of the research. This Note examines the structural and organizational factors that influence the output of Polish media. Section II reviews the changing position of the media in the Polish Communist system in the postwar period and provides a basis for understanding both the important general distinctions among the Stalinist, 1956, Gomulka, and Gierek periods and related changes in the instruments of Party control. Section III examines the various instruments by which the Party exercises direct and indirect supervision over the media. Sections IV and V describe key elements of the internal organization and editorial process, respectively, that affect the output of Polish media organs.
DTIC
News Media; Periodicals; Poland

20080041617 RAND Corp., Santa Monica, CA USA
The Media and Intra-Elite Communication in Poland: The System of Censorship
Curry, Jane L; Dec 1980; 72 pp.; In English
Report No.(s): AD-A483782; RAND-N-1514/2; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483782

The Rand Corporation is conducting a multiyear comparative study of the role of the media in intra-elite communication in Communist countries. Western analysts of the political process in 'closed' Communist systems necessarily rely heavily on the published and broadcast output of the mass and specialized media. These media are in part propaganda organs, but they also have other functions. A generation of Sovietologists has had to base much of its analysis of policies and politics on interpretations of media nuances. Yet their assumptions about the relationship between the media and the political actors whose behavior or attitudes are inferred from them have received little attention. The Rand study was initiated to fill this need. Its

emphasis is not on techniques of content analysis, but rather on the process by which politically significant material appears in Communist-country media. The principal data base of the study is information obtained from interviews with 44 emigres formerly involved in the media process as writers, journalists, editors, censors, and government and Party officials. The results of this study are published in a Summary Report, which provides an overview and conclusions, and in a series of Rand Notes, which contain more detailed analyses and documentation of the research. The Main Administration for Control of the Press, Publications, and Public Performances (GUKPPiW) is formally responsible for all censorship. GUKPPiW must monitor every public word in Poland, from obituaries to the mass media and artistic performances. To do this, its censors rely on their own sense of what is politically and culturally appropriate; on the political position and power of a contributor and the contributing producer; and on direct and indirect instructions and responses from Party and state institutions. This Note describes the censorship process in Poland and the ways in which GUKPPiW and other informal controls determine what information is made public.
DTIC
Leadership; News Media; Poland

20080041618 RAND Corp., Santa Monica, CA USA
The Media and Intra-Elite Communication in Poland: The Role of 'Special Bulletins'
Curry, Jane L; Dec 1980; 31 pp.; In English
Report No.(s): AD-A483783; RAND-N-1514/4; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483783

The Rand Corporation is conducting a multiyear comparative study of the role of the media in intra-elite communication in Communist countries. Western analysts of the political process in 'closed' Communist systems necessarily rely heavily on the published and broadcast output of the mass and specialized media. These media are in part propaganda organs, but they also have other functions. A generation of Sovietologists has had to base much of its analysis of policies and politics on interpretations of media nuances. Yet their assumptions about the relationship between the media and the political actors whose behavior or attitudes are inferred from them have received little attention. The Rand study was initiated to fill this need. Its emphasis is not on techniques of content analysis, but rather on the process by which politically significant material appears in Communist-country media. The principal data base of the study is information obtained from interviews with 44 emigres formerly involved in the media process as writers, journalists, editors, censors, and government and Party officials. The results of this study are published in a Summary Report, which provides an overview and conclusions, and in a series of Rand Notes, which contain more detailed analyses and documentation of the research. Parallel to the mass circulation media in Poland is an elaborate system of limited-circulation bulletins. These include straight translations of international wire service reports, transcripts of Western radio broadcasts into Poland, and reprints of articles censored from the mass media. These bulletins serve as an important information source for the policymaking elite and have an important effect on mass media analyses of national and international events and on politics generally. This Note focuses on specific Special Bulletins: Polish Press Agency Internal Bulletins, Polish Radio Monitoring Bulletin, and the Censorship Office Bulletin of Censored Articles.
DTIC
Periodicals; Poland; Translating

20080041619 RAND Corp., Santa Monica, CA USA
The Media and Intra-Elite Communication in Poland: Case Studies of Controversy
Curry, Jane L; Johnson, A R; Dec 1980; 160 pp.; In English
Report No.(s): AD-A483784; RAND-N-1514/5; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483784

The Rand Corporation is conducting a multiyear comparative study of the role of the media in intra-elite communication in Communist countries. Western analysts of the political process in 'closed' Communist systems necessarily rely heavily on the published and broadcast output of the mass and specialized media. These media are in part propaganda organs, but they also have other functions. A generation of Sovietologists has had to base much of its analysis of policies and politics on interpretations of media nuances. Yet their assumptions about the relationship between the media and the political actors whose behavior or attitudes are inferred from them have received little attention. The Rand study was initiated to fill this need. Its emphasis is not on techniques of content analysis, but rather on the process by which politically significant material appears in Communist-country media. The principal data base of the study is information obtained from interviews with 44 emigres formerly involved in the media process as writers, journalists, editors, censors, and government and Party officials. The results of this study are published in a Summary Report, which provides an overview and conclusions, and in a series of Rand Notes, which contain more detailed analyses and documentation of the research. This Note documents six case studies of controversy

in Polish media: (1) The wide-ranging media campaign during the March 1968 crisis, which was directly linked with internecine political struggle within the Polish United Workers' Party (PUWP); (2) The 'Falkowska debate' of 1964; (3) The differentiated treatment of the German question in the media in the late 1960s; (4) The 1971 media debate over the law on social parasitism; (5) The 1976 controversy over amendments to the Polish constitution; and (6) The media discussions of 1977 and 1978 concerning decentralization and unemployment.
DTIC
News Media; Poland

20080041620 RAND Corp., Santa Monica, CA USA
The Media and Intra-Elite Communication in Poland: The Role of Military Journals
Johnson, A R; Dec 1980; 38 pp.; In English
Report No.(s): AD-A483785; RAND-N-1514/3; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483785

The Rand Corporation is conducting a multiyear comparative study of the role of the media in intra-elite communication in Communist countries. Western analysts of the political process in 'closed' Communist systems necessarily rely heavily on the published and broadcast output of the mass and specialized media. These media are in part propaganda organs, but they also have other functions. A generation of Sovietologists has had to base much of its analysis of policies and politics on interpretations of media nuances. Yet their assumptions about the relationship between the media and the political actors whose behavior or attitudes are inferred from them have received little attention. The Rand study was initiated to fill this need. Its emphasis is not on techniques of content analysis, but rather on the process by which politically significant material appears in Communist-country media. The principal data base of the study is information obtained from interviews with 44 emigres formerly involved in the media process as writers, journalists, editors, censors, and government and Party officials. The results of this study are published in a Summary Report, which provides an overview and conclusions, and in a series of Rand Notes, which contain more detailed analyses and documentation of the research. This Note documents the organization and functioning of Polish military media. 'Military media' is a category that embraces a range of publications issued by and addressed to officers and soldiers of the Polish armed forces. In terms of intended rank of audience, publications range from the classified bulletins and theoretical journals directed at senior officers to an illustrated weekly for enlisted men. In terms of function and content, military publications fall into one of two quite distinct categories: 'professional' or 'political' organs. Additionally, the Ministry of Defense Publishing House publishes a variety of military (and nonmilitary) books.
DTIC
News Media; Poland

20080041637 RAND Corp., Santa Monica, CA USA
The Media and Intra-Elite Communication in Poland: The Role of Military Journals -- Annex
Sadykiewicz, Michael; Feb 1983; 24 pp.; In English
Report No.(s): AD-A483834; RAND-N-1514/6; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483834

This Annex supplements Section I, 'Organization of Polish Military Media,' of Rand Note N-1514/3, 'The Media and Intra-Elite Communication in Poland: The Role of Military Journals,' December 1980, by A. Ross Johnson. The Annex was prepared by Michael Sadykiewicz, a Rand consultant. The author, a former Polish army officer, has published articles in many Polish military journals and has served on the editorial board of the ground forces journal, 'Przeglad Wojsk Ladowych.' Section I of this Annex presents a typology of the Polish military press. The typology classifies the Polish military press according to the following 10 criteria: Purpose, Accessibility, Publication Level, Publication Frequency, Area of Interest, Targeted Audience, Content, Circulation, Financing of Circulation, and Printers. Section II presents a chart showing the organization of the Polish military press system. Section III lists members of the editorial committees of 'Przeglad Wojsk Ladowych' and 'Mysl Wojskowa.'
DTIC
News Media; Poland

20080041640 Naval Postgraduate School, Monterey, CA USA
Changing Homeland Security: Ten Essential Homeland Security Books
Bellavita, Christopher; Feb 2007; 25 pp.; In English
Report No.(s): AD-A483837; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483837

This article presents what I consider to be ten essential homeland security books. The list is personal and provisional. The

discipline is too new to have a canon. We need to continuously examine what is signal and what is background noise in homeland security's academic environment. Much has been written about homeland security. A lot more is in the publishing pipeline. My list includes books I find myself returning to as I seek to understand contemporary homeland security events. Beyond personal interest, I believe they form a foundation for a growing understanding of the parameters of what it means to study homeland security as a professional discipline. Other books and important articles could be added, but ten is sufficient to start. These books are: ' The Final Report of the National Commission on Terrorist Attacks Upon the USA: 9/11 Commission Report (2004) ' The National Strategy for Homeland Security (2002) ' After: How America Confronted the September 12 Era (2003) ' Imperial Hubris: Why the West is Losing the War on Terror (2004) ' America the Vulnerable: How Our Government is Failing to Protect Us From Terrorism (2004) ' Homeland Security: A Complete Guide to Understanding, Preventing, and Surviving Terrorism (2005) ' Catastrophe Preparation and Prevention for Law Enforcement Professionals (2008) ' Trapped in the War on Terror (2006) ' Unconquerable Nation: Knowing Our Enemy; Strengthening Ourselves (2006) ' The Declaration of Independence (1776), The Articles of Confederation (1777), and The Constitution of the USA of America (1787) Taken together, these works outline a broad historical narrative about homeland security. We were attacked. We quickly developed a strategy to make sure we prevented future attacks. We tried to come to terms with what happened to us as a nation. Next, textbooks and workbooks aiming to systematize homeland security ideas started to appear.
DTIC
Law (Jurisprudence); Security; Terrorism; Textbooks

20080041711 Naval Postgraduate School, Monterey, CA USA
Integrated Data-Driven DSS in a Laboratory Environment
Hargrave, Brian L; Jun 2008; 77 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484032; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484032

Decision support technologies have remained individualistic as primarily stand-alone platforms. The ability to access and integrate a wide range of such technologies in an Integrated Decision Technology Environment (IDTE) can potentially increase a user's ability to create more complex decision support projects. A well-designed IDTE will allow users to identify, learn about, access, execute and integrate disparate decision technologies. Data-Driven DSS provide decision makers with the capability to store and sort vast amounts of data by leveraging data warehousing and data mining. These data-oriented decision technologies can assist decision makers in making better and more informed decisions in shorter durations of time. This thesis focuses on Data-Driven data mining decision technologies and how they can be integrated into an IDTE. In the process of identifying data mining technology requirements, the author first created a simple taxonomy characterized by the four categories of association, classification, clustering, and prediction. He then designed a database schema for storing the requisite data about data mining technologies, and case studies illustrating their use. Finally, he designed a simple, yet effective interface for navigating through the data-driven decision technology universe both at NPS and beyond. SQL commands for populating the various screens of the IDTE interface were provided to show proof of concept.
DTIC
Data Bases; Data Mining; Decision Making; Decision Support Systems; Graphical User Interface; Information Retrieval; Systems Integration

20080041794 Naval Postgraduate School, Monterey, CA USA
Is Electronic Privacy Achievable?
Irvine, Cynthia E; Levin, Timothy E; May 2000; 3 pp.; In English
Report No.(s): AD-A483982; No Copyright; Avail.: Defense Technical Information Center (DTIC)

While secrecy and integrity policies are most often crafted for the protection of corporate information, privacy policies are crafted for the protection of information for and about individuals. The purpose of this panel was to focus on how new technologies are affecting privacy. Technologies that might adversely affect privacy were identified by Rein Turn at previous symposia: electronic funds transfer records; electronic mail monitoring tools; automated home services, including e-commerce and information on request; home monitoring services for security, health, and energy management; use of smart cards; mobile computers in the transportation system; and implanted medical and locating devices. Despite the historical lack of support for privacy research on the part of government, military, and industry, it is encouraging to see recent developments in theory, techniques, and products to support privacy. The authors recognize three camps of new technology that are relevant to the privacy debate: privacy-enhancing technology, information-accumulating technology, and investigatory technology. For this panel, they invited representatives from the first and third camps. The panelists were encouraged to engage in a technical discussion as to whether electronic privacy is achievable, rather than a philosophical or political discussion. The discussion

was initiated as a pseudo debate. Proponents were asked to make a specific proposition regarding the privacy properties of a particular technology, i.e., how their product or technique works. The opponents were asked to question the effectiveness of the privacy mechanisms. The debate was intended to shed some light on new privacy technologies and their ability to provide personal privacy in the information age.
DTIC
Computer Information Security; Privacy; Protection; Security

20080041825 Naval Postgraduate School, Monterey, CA USA
Surmounting the Effects of Lossy Compression on Steganography
Currie, III, Daniel L; Irvine, Cynthia E; Oct 1996; 9 pp.; In English
Report No.(s): AD-A484185; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Steganographic techniques can be used to hide data within digital images with little or no visible change in the perceived appearance of the image and can be exploited to export sensitive information. Since images are frequently compressed for storage or transmission, effective steganography must employ coding techniques to counter the errors caused by lossy compression algorithms. The Joint Photographic Expert Group 'JPEG' compression algorithm, while producing only a small amount of visual distortion, introduces a relatively large number of errors in the bitmap data. It is shown that, despite errors caused by compression, information can be steganographically encoded into pixel data so that it is recoverable after JPEG processing, though not with perfect accuracy.
DTIC
Algorithms; Compressibility Effects; Digital Systems; Images; Steganography

20080041832 Naval Postgraduate School, Monterey, CA USA
A Video Game for Cyber Security Training and Awareness
Cone, Benjamin D; Irvine, Cynthia E; Thompson, Michael F; Nguyen, Thuy D; Jan 2006; 11 pp.; In English
Report No.(s): AD-A484204; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Although many of the concepts included in cyber security awareness training are universal, such training often must be tailored to address the policies and requirements of a particular organization. In addition, many forms of training fail because they are rote and do not require users to think about and apply security concepts. A flexible, highly interactive video game, CyberCIEGE, is described as a security awareness tool that can support organizational security training objectives while engaging typical users in an engaging security adventure. The game is now being successfully utilized for information assurance education and training by a variety of organizations. Preliminary results indicate the game can also be an effective addition to basic information awareness training programs for general computer users 'e.g., annual awareness training.'
DTIC
Education; Game Theory; Games; Security

20080041834 Naval Postgraduate School, Monterey, CA USA
Valued Information at the Right Time (VIRT): Why Less Volume is More Value in Hastily Formed Networks
Hayes-Roth, Frederick; Jan 2006; 11 pp.; In English
Report No.(s): AD-A484210; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Defense and homeland security leaders have focused recently on the problems of fielding networks to enable rapid decision-making and agile responses to various crises. Mostly they have concentrated on the lowest levels of networks, namely the hardware and software to enable bits to flow from senders to receivers. However, most crises require a different approach, one that emphasizes the highest levels of network design. At these levels, the problems we focus on are: Who needs What information, and How does that information Find them? In addition, because people in crises have so little time, we must also answer this question: How do we assure receivers are not glutted by a deluge of low-value data and consumed by attendant low-value tasks? Our answers to these questions employ dynamic context and operator requirements to assure that high-value information flows quickly where it's needed and is processed promptly by recipients. We call this approach Valued Information at the Right Time 'VIRT'. Initial studies have shown that this approach reduces the volume of bits by several orders of magnitude. It also raises the productivity of every operator enormously by assuring each can give immediate attention to truly valued information. A VIRT perspective leads us to see networks as information supply chains. Well-designed supply chains will dramatically improve the performance of hastily formed networks 'HFNs'
DTIC
Communication Networks; Security

20080041872 International Association of Virtual Organizations Research and Scientific, Durham, NC USA
Platform Routing and Data Fusion Technologies for Cooperative ISR - fmCortex (Trademark)
Grinstead, Brad; Jun 13, 2008; 32 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-07-C-0085
Report No.(s): AD-A484304; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This report begins by providing a review of the original problem definition as well as the stated objectives for the Phase I research and development. Namely: (1) Investigate optimal platform routing techniques and algorithms to optimize collection for fusion metric benefits while satisfying collection and de-confliction requirements; (2) Select, research and define applications and appropriate optimization techniques for fusion of multi-source data from wide-body and UAV on-board sensors; (3) Utilize Measures of Performance (MOPs) to determine fusion resultant improvements.
DTIC
Intelligence; Multisensor Fusion; Reconnaissance; Surveillance

20080042007 Naval Facilities Engineering Service Center, Port Hueneme, CA USA
Potable Water Quality Management Guidance Document User Guide UG-2077-ENV
Lagerquist, Jenny; Sep 2007; 102 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483240; UG-2077-ENV; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483240

The document provides guidance and potential solutions to Navy installations for drinking water distribution system issues. The document focuses on issues and solutions to disinfection by product formation.
DTIC
Manuals; Navy; Potable Water; Water Quality

20080042048 Program Manager Information Sharing Environment, Washington, DC USA
Feasibility Report: Report for the Congress of the USA
Mar 2008; 24 pp.; In English
Report No.(s): AD-A484227; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This Report on the ISE presents the feasibility of the concepts that Congress has raised for consideration to promote information sharing. The Report addresses these issues by leveraging the expertise and knowledge of ongoing initiatives associated with these concepts across the Federal government. As such, the Report is organized in three distinct sections; each focused on one of the concepts based upon interagency efforts.
DTIC
Feasibility; United States

20080042056 National Science and Technology Council, Washington, DC USA
Manufacturing the Future: Federal Priorities for Manufacturing Research and Development. Report of the Interagency Working Group on Manufacturing R&D, Committee on Technology, National Science and Technology Council
Russell, Richard; Boehm, Jason; Hall, Dale; Merzbacher, Celia; Stieren, David; Skemp, Susan; Mar 2008; 103 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483615; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This report of the Interagency Working Group (IWG) on Manufacturing Research and Development (R&D) outlines three areas of opportunity for manufacturing R&D and describes critical manufacturing technology issues that need to be addressed in each area in order to make progress. areas are (1) manufacturing for the hydrogen economy; (2) nanomanufacturing; and (3) intelligent and integrated manufacturing. The report also describes Federal activities in the three areas and current and planned collaborative efforts. Finally, the report provides an overview of important cross-cutting issues that affect R&D for all three areas.
DTIC
Manufacturing; Nanotechnology; Policies; Priorities; Research and Development; Research Management; Technologies; Technology Assessment; United States

20080042124 Program Manager Information Sharing Environment, Washington, DC USA
Annual Report to the Congress on the Information Sharing Environment
McNamara, Thomas E; Jun 30, 2008; 74 pp.; In English
Report No.(s): AD-A484199; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This second Annual Report to the Congress on the Information Sharing Environment (ISE) is submitted in accordance with requirements in Section 1016(h) of the Intelligence Reform and Terrorism Prevention Act of 2004, as amended (IRTPA). This Report describes the state of the ISE, highlights areas where there has been measurable progress in improving information sharing, and demonstrates the value of the ISE to the Nation's broader counterterrorism (CT) mission. In particular, the President's October 2007 National Strategy for Information Sharing (NSIS) reinforced the importance of information sharing as a national priority. The NSIS integrates all prior terrorism-related information sharing policies, directives, plans, and recommendations and provides a national framework against which to implement the ISE. The enactment of IRTPA in December 2004 signaled the start of a major effort to ensure that barriers to information sharing were removed and that best practices were employed across Federal agencies. While the complexity of the information-sharing challenge should not be underestimated, significant progress has been made. This Report addresses progress in information sharing to date while revealing how the paradigm of information sharing - and the ISE in particular - has broadly permeated our institutions of government. ISE accomplishments are significant when viewed according to the original mandate, set forth in the President's December 16, 2005 Memorandum to the Heads of Executive Departments and Agencies on the Guidelines and Requirements in Support of the Information Sharing Environment, which set forth the Presidential Information Sharing Guidelines. These guidelines are implemented by leveraging ongoing information sharing efforts and supported by promoting a culture of information sharing.

DTIC
Congressional Reports; Planning; Risk; Security

20080042227 Defence Science and Technology Organisation, Edinburgh, Australia
Resolving Partial Name Mentions Using String Metrics
Das, Jyotsna; Choong, Poh Lian; Dec 2007; 40 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484334; DSTO-RR-0318; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Information Extraction is concerned with discovering entities, relationships and events from text. Before relationships and events can be discovered accurately, it is critical to resolve all mentions of the same entity. This process is known as coreference resolution. Coreferenced mentions of entities can occur in a number of forms including pronominal mentions; partial name mentions; and through the use of honorifics. This report focuses on addressing the problem of resolving partial name mentions to their canonical form within a text document using character-based string metrics. Based on a review and investigation of some of the main character-based string metrics, we developed a method to resolve partial name mentions within a document. This method applies the Jaro-Winkler string comparator and a variation of the Smith-Waterman string similarity measure. The method was applied to name mentions sourced from a sample of emails with a precision of 97%, and news articles with a precision of 100%.

DTIC
Character Recognition; Data Processing; Extraction; Resolution; Strings

20080042323 Jenkins, Wilson and Taylor, PA, Durham, NC, USA; Duke Univ., Durham, NC, USA
Systems, Methods, and Computer Program Products for System Online Availability Estimation
Mishra, K., Inventor; Trivedi, K., Inventor; 9 Nov 04; 18 pp.; In English
Contract(s)/Grant(s): ARO-C-DAAD19 01-1-0646
Patent Info.: Filed Filed 9 Nov 04; US-Patent-Appl-SN-10-984 576
Report No.(s): PB2008-104308; No Copyright; Avail.: CASI: A03, Hardcopy

Systems, methods, and computer program products for system online availability estimation. A method according to one embodiment can include a step for providing an availability model of a system. The method can also include a step for receiving behavior data of the system. In addition, the method can include estimating a plurality of parameters for the availability model based on the behavior data. The method can also include determining individual confidence intervals for each of the parameters. Further, the method can include determining an overall confidence interval for the system based on the individual distributions of the estimated parameters. The method can also include determining control actions based on the estimated overall availability or inferred parameter values.

NTIS
Computer Programs; Patent Applications; Data Systems

83
ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

20080041575 Government Accountability Office, Washington, DC, USA
NASA Agency Faces Challenges Defining Scope and Costs of Space Shuttle Transition and Retirement
September 2008; 21 pp.; In English; Original contains black and white illustrations
Report No.(s): GAO-08-1096; No Copyright; Avail.: CASI: A03, Hardcopy

NASA faces disparate challenges in defining the scope and cost of the Space Shuttle Program (SSP) transition and retirement activities. Because the Constellation program is still finalizing its requirements, the agency does not yet know the full extent of SSP property it needs to retain or what the full cost of the transition effort will be. In addition, NASA faces other challenges that further hamper the agency s efforts to manage transition activities and develop firm estimates of SSP transition and retirement scope and cost. For example, NASA has yet to develop final plans and/or cost estimates for 'safing' artifacts, including the space shuttle orbiters Atlantis, Discovery, and Endeavour. The total cost of SSP transition and retirement is not transparent in NASA s current budget request and is not expected to be fully reflected as such in NASA s fiscal year 2010 budget request, when the agency plans to include its first official estimate of the scope and cost. Although SSP's direct transition and retirement costs are included in the SSP budget line, the Cross-Agency Support portion of NASA s budget request includes funding for significant SSP transition and retirement activities the agency considers indirect costs, including environmental compliance and remediation and demolition of excess facilities. These funds, however, are not identified as SSP transition and retirement costs, nor is it easy to discern that they could be in examining this budget line. In addition, NASA plans to offset some transition costs by utilizing an 'exchange/sale' authority that allows executive agencies to exchange or sell non-excess, non-surplus personal property and apply the proceeds toward acquiring similar replacement property. To provide congressional decision makers with a more transparent assessment of funding needs for the SSP s property transition and retirement activities, we are recommending that NASA include more comprehensive estimates of transition and retirement costs in its future budget requests to include identification of all direct and indirect costs and potential exchange/sale proceeds. Derived from text

Cost Estimates; Space Shuttle Orbiters; Economic Analysis; Retirement; Budgeting; Financial Management

88
SPACE SCIENCES (GENERAL)

Includes general research topics related to the natural space sciences. For specific topics in space sciences see *categories 89 through 93*.

20080041547 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Mars Ozone Absorption Line Shapes from Infrared Heterodyne Spectra Applied to GCM-Predicted Ozone Profiles and to MEX/SPICAM Column Retrievals
Fast, Kelly E.; Kostiuk, T.; Annen, J.; Hewagama, T.; Delgado, J.; Livengood, T. A.; Lefevre, F.; October 10, 2008; 1 pp.; In English; CIRS Team Meeting/AAS Division of Planetary Sciences Meeting, 10-15 Oct. 2008, Ithaca, NY, USA; Copyright; Avail.: Other Sources; Abstract Only

We present the application of infrared heterodyne line shapes of ozone on Mars to those produced by radiative transfer modeling of ozone profiles predicted by general circulation models (GCM), and to contemporaneous column abundances measured by Mars Express SPICAM. Ozone is an important tracer of photochemistry Mars' atmosphere, serving as an observable with which to test predictions of photochemistry-coupled GCMs. Infrared heterodyne spectroscopy at 9.5 microns with spectral resolving power >1,000,000 is the only technique that can directly measure fully-resolved line shapes of Martian ozone features from the surface of the Earth. Measurements were made with Goddard Space Flight Center's Heterodyne instrument for Planetary Wind And Composition (HIPWAC) at the NASA Infrared Telescope Facility (IRTF) on Mauna Kea, Hawaii on February 21-24 2008 UT at Ls=35deg on or near the MEX orbital path. The HIPWAC observations were used to test GCM predictions. For example, a GCM-generated ozone profile for 60degN 112degW was scaled so that a radiative transfer calculation of its absorption line shape matched an observed HIPWAC absorption feature at the same areographic position, local time, and season. The RMS deviation of the model from the data was slightly smaller for the GCM-generated profile than for a line shape produced by a constant-with-height profile, even though the total column abundances were the same, showing potential for testing and constraining GCM ozone-profiles. The resulting ozone column abundance from matching the model to the HIPWAC line shape was 60% higher than that observed by SPICAM at the same areographic

position one day earlier and 2.5 hours earlier in local time. This could be due to day-to-day, diurnal, or north polar region variability, or to measurement sensitivity to the ozone column and its distribution, and these possibilities will be explored. This work was supported by NASA's Planetary Astronomy Program.
Author
Atmospheric General Circulation Models; Heterodyning; Photochemical Reactions; Radiative Transfer; Planetary Composition; Infrared Radiation; Atmospheric Composition

89
ASTRONOMY

Includes observations of celestial bodies; astronomical instruments and techniques; radio, gamma-ray, x-ray, ultraviolet, and infrared astronomy; and astrometry.

20080040798 NASA Goddard Space Flight Center, Greenbelt, MD, USA
NASA High Contrast Imaging for Exoplanets
Lyon, Richard G.; [2008]; 1 pp.; In English; Optical Society of America meeting, 19-23 Oct. 2008, Rochester, NY, USA; No Copyright; Avail.: Other Sources; Abstract Only

Described is NASA's ongoing program for the detection and characterization of exosolar planets via high-contrast imaging. Some of the more promising proposed techniques under assessment may enable detection of life outside our solar system. In visible light terrestrial planets are approximately 10(exp -10) dimmer than the parent star. Issues such as diffraction, scatter, wavefront, amplitude and polarization all contribute to a reduction in contrast. An overview of the techniques will be discussed.
Author
Planet Detection; Coronagraphs; Extrasolar Planets

20080040799 National Optical Astronomy Observatories, Tucson, AZ, USA; National Solar Observatory, Tucson, AZ, USA
NOAO/NSO Newsletter: Issue 95
September 2008; 50 pp.; In English; Original contains black and white illustrations; Copyright; Avail.: Other Sources

The science articles in this issue are: Echoes of Galactic Supernovae, Observations of a Small Emergent Bipolar Flux Region, Carbon-enhanced Metal-poor Stars and the Chemical Evolution of the Early Galaxy and Do Solar Subsurface Vorticity Measurements Improve Flare Forecasting?
CASI
Telescopes; Astronomy; Astronomical Observatories; Solar Observatories

20080040874 NASA Goddard Space Flight Center, Greenbelt, MD, USA; NASA Goddard Space Flight Center, Greenbelt, MD, USA; NASA Goddard Space Flight Center, Greenbelt, MD, USA; NASA Goddard Space Flight Center, Greenbelt, MD, USA
Mini Survey of SDSS [OIII] AGN with Swift: Testing the Hypothesis that L(sub [OIII]) Traces AGN Luminosity
July 02, 2007; 1 pp.; In English; X-Ray Surveys: Evolution of Accretion, Star-Formation and the Large Scal Structure, 2 - 6 Jul. 2007, Rodos, Greece; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The number of AGN and their luminosity distribution are crucial parameters for our understanding of the AGN phenomenon. Recent work strongly suggests every massive galaxy has a central black hole. However most of these objects either are not radiating or have been very difficult to detect We are now in the era of large surveys, and the luminosity function (LF] of AGN has been estimated in various ways. In the X-ray band. Chandra and XMM surveys have revealed that the LF of hard X-ray selected AGN shows a strong luminosity-dependent evolution with a dramatic break towards low L(sub x) (at all z). This is seen for all types of AGN, but is stronger for the broad-line objects. In sharp contrast, the local LF of optically-selected samples shows no such break and no differences between narrow and broad-line objects. If as been suggested, hard X ray and optical emission line can both can be fair indicators of AGN activity, it is important to first understand how reliable these characteristics are if we hope to understand the apparent discrepancy in the LFs.
Author
Galaxies; Luminosity; Active Galactic Nuclei; Brightness; X Ray Astronomy; Spaceborne Astronomy

20080041142 Naval Observatory, Washington, DC USA

Realization and Application of a 111 Million Pixel Backside-Illuminated Detector and Camera

Zacharias, Norbert; Dorland, Bryan; Bredthauer, Richard; Boggs, Kasey; Bredthauer, Greg; Lesser, Mike; Sep 21, 2007; 9 pp.; In English

Report No.(s): AD-A483319; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483319

A full-wafer, 10,580 x 10,560 pixel (95 x 95 mm) CCD was designed and tested at Semiconductor Technology Associates (STA) with 9 um square pixels and 16 outputs. The chip was successfully fabricated in 2006 at DALSA and some performance results are presented here. This program was funded by the Office of Naval Research through a Small Business Innovation in Research (SBIR) program requested by the U.S. Naval Observatory for its next generation astrometric sky survey programs. Using Leach electronics, low read-noise output of the 111 million pixels requires 16 seconds at 0.9 MHz. Alternative electronics developed at STA allow readout at 20 MHz. Some modifications of the design to include anti-blooming features, a larger number of outputs, and use of p-channel material for space applications are discussed.

DTIC

Aerospace Engineering; Astronomy; Cameras; Detectors; Illuminating; Pixels

20080041143 Naval Observatory, Washington, DC USA

The J-MAPS Mission: Improvements to Orientation Infrastructure and Support for Space Situational Awareness

Dorland, Bryan N; Gaume, Ralph A; Sep 2007; 8 pp.; In English; Original contains color illustrations

Report No.(s): AD-A483320; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483320

The Joint Milli-Arcsecond Pathfinder Survey (J-MAPS) mission is a star mapping microsat mission proposed for launch in the 2011 timeframe. The primary objectives of J-MAPS are to generate star catalogs that are 15 times more accurate at current epoch (2007) and 100 times denser than those based on the Hipparcos mission, demonstrate the ability to measure pointing to 10 milliarcseconds (mas) and control pointing to 50 mas on-orbit with a microsat bus, and to mature and risk reduce technology for next generation attitude determination systems, and both down- and up-looking imaging systems. The instrument, a 15 cm aperture telescope with an 8k x 8k CMOS-Hybrid focal plane array, will observe stars to 1 mas mission accuracy down to 12th magnitude, with reduced accuracy to 15th magnitude. J-MAPS can also be used to observe resident space objects with extreme metric accuracy, with the potential to contribute significantly to the space surveillance network's ability to rapidly determine orbits, recover maneuvers, assess conjunctions and update the space object catalog. These capabilities, to be demonstrated on-orbit, will complement the capabilities of future systems and can actually serve as an SSA asset multiplier by reducing the individual target workload on these future systems, increasing overall target throughput.

DTIC

Mapping; Situational Awareness

20080041146 Naval Observatory, Washington, DC USA

Locating Double Stars in the UCAC with the WDS Catalog and CCD Parameters

Dutta, Sumit; Jul 3, 2008; 6 pp.; In English

Report No.(s): AD-A483340; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483340

Double star orbits are determined to aid navigation and communications, but are often compiled from limited observations. The identification of double stars in the USNO CCD Astrograph Catalog (UCAC) provides a means to discover new double stars and improve orbital information for known double stars. Several artifacts remained in the pixel data after the UCAC2 release, including the presence of a bright streak along the x-axis of bright stars resulting from a shutter problem, and the presence of cosmic ray events on individual CCD frames. Starting with a list of already identified potential double stars, these artifacts were detected and potential double stars were flagged for whether they were affected by either artifact. In addition, the Washington Double Star Catalog was matched with potential UCAC double stars. From these identifications, each potential double star was flagged for whether (1) they actually do not exist but were listed due to being on a streak, (2) they are cosmic rays instead, or (3) they are most likely double stars, verified with a Washington Double Star Catalog match if possible. Despite that matches were within 1-15 px of each other, coordinate accuracy could still be improved by using double orbital catalogs and proper motions from the UCAC. Most cosmic ray events and almost all bright streaks were detected successfully, providing a sortable list of double stars that can be used by astronomers to discover new double stars and improve currently known double stars' orbits.

DTIC

Catalogs (Publications); Charge Coupled Devices; Double Stars; Orbits; Position (Location)

20080041147 Naval Observatory, Washington, DC USA
Imaging the Oxygen-Rich Disk Toward the Silicate Carbon Star EU Andromedae
Ohnaka, K; Boboltz, D A; Dec 2007; 7 pp.; In English
Report No.(s): AD-A483341; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483341

Silicate carbon stars are characterized by oxygen-rich circumstellar environments as revealed by prominent silicate emission, despite their carbon-rich photospheres. While the presence of a circumbinary disk or a disk around an unseen, low-luminosity companion has been suggested to explain the peculiar dust chemistry, the origin of silicate carbon stars is still a puzzle to date. We present multi-epoch, high-angular resolution observations of 22 GHz H2O masers toward the silicate carbon star EU And to probe the spatio-kinematic distribution of oxygen-rich material. Methods. EU And was observed at three epochs (maximum time interval of 14 months) with the Very Long Baseline Array (VLBA). Our VLBA observations of the 22 GHz H2O masers have revealed that the maser spots are distributed along a straight line across <20 mas, with a slight hint of an S-shaped structure.

DTIC

Andromeda Constellation; Carbon; Carbon Stars; Imaging Techniques; Oxygen; Silicates

20080041249 Naval Observatory, Washington, DC USA
Prospects for Improving the Masses of Minor Planets
Hilton, J L; Sep 2007; 5 pp.; In English
Report No.(s): AD-A483464; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Among the largest uncertainties in the fundamental constants of astronomy are the masses of the minor planets. They constitute the largest source of uncertainty in the ephemerides of the inner planets. Few asteroid masses are known with an uncertainty of better than about 50%. With a few exceptions, minor planet masses are determined by observing the perturbation of a massive minor planet on a smaller one during a close encounter. The recent explosion of discoveries of minor planets and the increased accuracy of modern astrometric catalogs means that it may be possible to discover more such encounters. A series of simple filters were developed to search for these encounters. For example, three encounters were found with Ceres, which are almost certainly strong enough to provide a mass estimate with a significantly smaller uncertainty than current estimates prior to Dawn's arrival there in 2015.

DTIC

Asteroids; Mass; Planets

20080041254 Naval Observatory, Washington, DC USA
Time Series Analysis of VLBI Astrometric Source Positions at 24-GHZ
Boboltz, D A; Fey, A L; Sep 2007; 5 pp.; In English
Report No.(s): AD-A483471; No Copyright; Avail.: Defense Technical Information Center (DTIC)

To date there have been 10 VLBI experiments observed over a period spanning 5 years and analyzed for the purpose of establishing a high-frequency (24 GHz) reference frame. The database now contains information on 274 sources and a total of 1052 images. From the data, we have produced a high-frequency astrometric catalog of 266 sources. Of these 266 sources, 88 of them have been observed in at least five epochs. We produced time series of source positions for each of the 88 sources and compare source position variations at 24 GHz with variations in the same sources at X band. Here we discuss the astrometric catalog, the stability of the sources at 24 GHz, and the possible implications for ICRF2.

DTIC

Astrometry; Interferometry; Time Series Analysis; Very Long Base Interferometry

20080041255 Naval Observatory, Washington, DC USA
Current Status of the IAU Working Group for Numerical Standards of Fundamental Astronomy
Luzum, B; Capitaine, N; Fienga, A; Folkner, W; Fukushima, T; Hilton, J; Hohenkerk, C; Krasinsky, G; Petit, G; Pitjeva, E; Soffel, M; Wallace, P; Sep 2007; 4 pp.; In English
Report No.(s): AD-A483472; No Copyright; Avail.: Defense Technical Information Center (DTIC)

At the 2006 International Astronomical Union (IAU) General Assembly (GA), a proposal was adopted to form the Working Group (WG) for Numerical Standards of Fundamental Astronomy. The goal of the WG are to update 'IAU Current Best Estimates' conforming with IAU Resolutions, the International Earth Rotation and Reference System Service (IERS) Conventions, and the Syst′eme International d'Unit es (SI). Initial efforts have concentrated on determining which constants

should be considered, the terminology regarding the description of the constants, and the dependence of the constant estimates on their associated models. The current status of WG activities and the anticipated future directions are presented.
DTIC
Astronomy; Numerical Analysis

20080041439 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Zero CTE Glass in the Hubble Space Telescope
Wood, H. John; March 10, 2008; 32 pp.; In English; American Physical Society's March 2008 Meeting, 10 - 14 Mar. 2008, New Orleans, Louisiana, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041439

Orbiting high above the turbulence of the Earth's atmosphere, the Hubble Space Telescope (HST) has provided breathtaking views of astronomical objects never before seen in such detail. The steady diffraction-limited images allow this medium-size telescope to reach faint galaxies fainter than 30th stellar magnitude. Some of these galaxies are seen as early as 2 billion years after the Big Bang in a 13.7 billion year old universe. Up until recently, astronomers assumed that all of the laws of physics and astronomy applied back then as they do today. Now, using the discovery that certain supernovae are 'standard candles,' astronomers have found that the universe is expanding faster today than it was back then: the universe is accelerating in its expansion. The Hubble Space Telescope is a two-mirror Ritchey-Chretien telescope of 2.4m aperture in low earth orbit. The mirrors are made of Ultra Low Expansion (ULE) glass by Corning Glass Works. This material allows rapid figuring and outstanding performance in space astronomy applications. The paper describes how the primary mirror was mis-figured in manufacturing and later corrected in orbit. Outstanding astronomical images taken over the last 17 years show how the application of this new technology has advanced our knowledge of the universe. Not only has the acceleration of the expansion been discovered, the excellent imaging capability of HST has allowed gravitational lensing to become a tool to study the distribution of dark matter and dark energy in distant clusters of galaxies. The HST has touched practically every field of astronomy enabling astronomers to solve many long-standing puzzles. It will be a long time until the end of the universe when the density is near zero and all of the stars have long since evaporated. It is remarkable that humankind has found the technology and developed the ability to interpret the measurements in order to understand this dramatic age we live in.
Author
Astronomy; Hubble Space Telescope; Image Resolution; Spaceborne Astronomy

20080041580 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Probing the Distribution of Ozone on Mars
Fast, K. E.; Kostiuk, T.; Hewagama, T.; Livengood, T. A.; Lefevre, F.; Annen, J.; Delgado, J. D.; [2008]; 3 pp.; In English; 3r International Workshop on the Mars Atmosphere: Modeling and Observations, 10-13 Nov. 2008, Williamsburg, VA, USA; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

We present the application of infrared heterodyne line shapes of ozone on Mars to those produced by radiative transfer modeling of ozone profiles predicted by photochemistry-coupled general circulation models (GCM), and to contemporaneous column abundances measured by Mars Express SPICAM. Ozone is an important tracer of photochemistry in Mars' atmosphere, serving as an observable with which to test predictions of photochemical models. Infrared heterodyne measurements of ozone absorption features on Mars have been obtained at various Martian seasons from 1988 until present at the NASA Infrared Telescope Facility (IRTF) on Mauna Kea, Hawai'i [I]. The NASAiGoddard Space Flight Center spectrometers used were the Infrared Heterodyne Spectrometer (IRHS) [2, 3] and, since 2003, the Heterodyne Instrument for Planetary Wind and Composition (HIPWAC) [4]. A description the infrared heterodyne technique applied to ground-base observations of Martian ozone can be found in [I]. The most recent measurements on February 21-24 2008 UT at Ls=35deg were made by HIPWAC on or near the Mars Express orbital path with the goal of acquiring spectra that can be directly compared to nadir observations by SPICAM.
Derived from text
Atmospheric General Circulation Models; Infrared Radiation; Photochemical Reactions; Ozone; Infrared Spectrometers; Infrared Telescopes; Mars Express; Planetary Geology; Radiative Transfer

20080041581 NASA Goddard Space Flight Center, Greenbelt, MD, USA

CRISM Observations of Water Vapor and Carbon Monoxide

Smith, Michael D.; Wolff, Michael J.; Clancy, R. Todd; [2008]; 2 pp.; In English; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Near-infrared spectra returned by the Compact Reconnaissance Imaging Spectrometer for Mars (CRISM, [1]) on-board the Mars Reconnaissance Orbiter (MRO) contain the clear spectral signature of several atmospheric gases including carbon dioxide (CO2), water vapor (H2O), and carbon monoxide (CO). Here we describe the seasonal and spatial mapping of water vapor and carbon dioxide for one full Martian year using CRISM spectra.

Derived from text

Mars Reconnaissance Orbiter; Atmospheric Composition; Carbon Monoxide; Carbon Dioxide; Spectral Signatures; Water Vapor

20080041583 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Nucleosynthesis Predictions for Intermediate-Mass AGB Stars: Comparison to Observations of Type I Planetary Nebulae

Karakas, Amanda I.; vanRaai, Mark A.; Lugaro, Maria; Sterling, Nicholas C.; Dinerstein, Harriet L.; [2008]; 39 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): NNH06CC03B; NSF AST 04-06809; NSF AST 07-08245; Proj. D-P0664105; Copyright; Avail.: CASI: A03, Hardcopy

Type I planetary nebulae (PNe) have high He/H and N/O ratios and are thought to be descendants of stars with initial masses of approx. 3-8 Stellar Mass. These characteristics indicate that the progenitor stars experienced proton-capture nucleosynthesis at the base of the convective envelope, in addition to the slow neutron capture process operating in the He-shell (the s-process). We compare the predicted abundances of elements up to Sr from models of intermediate-mass asymptotic giant branch (AGB) stars to measured abundances in Type I PNe. In particular, we compare predictions and observations for the light trans-iron elements Se and Kr, in order to constrain convective mixing and the s-process in these stars. A partial mixing zone is included in selected models to explore the effect of a C-13 pocket on the s-process yields. The solar-metallicity models produce enrichments of [(Se, Kr)/Fe] less than or approx. 0.6, consistent with Galactic Type I PNe where the observed enhancements are typically less than or approx. 0.3 dex, while lower metallicity models predict larger enrichments of C, N, Se, and Kr. O destruction occurs in the most massive models but it is not efficient enough to account for the greater than or approx. 0.3 dex O depletions observed in some Type I PNe. It is not possible to reach firm conclusions regarding the neutron source operating in massive AGB stars from Se and Kr abundances in Type I PNe; abundances for more s-process elements may help to distinguish between the two neutron sources. We predict that only the most massive (M grester than or approx.5 Stellar Mass) models would evolve into Type I PNe, indicating that extra-mixing processes are active in lower-mass stars (3-4 Stellar Mass), if these stars are to evolve into Type I PNe.

Author

Planetary Nebulae; Stellar Mass; Asymptotic Giant Branch Stars; Massive Stars; B Stars; Carbon 13; Neutron Sources

20080041655 Naval Observatory, Washington, DC USA

Analysis of Astrometric Position Time Series for ICRF-2

Fey, A L; Boboltz, D A; Sep 2007; 3 pp.; In English

Report No.(s): AD-A483860; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: http://hdl.handle.net/100.2/ADA483860

A second realization of the International Celestial Reference Frame, ICRF-2, is currently underway with a projected completion date concurrent with the 2009 IAU General Assembly. This work is being carried out by two working groups: the IERS/IVS Working Group will generate ICRF-2 from VLBI observations of extragalactic radio sources, consistent with the current realization of the ITRF and EOP data products and the IAU working group will oversee the generation of ICRF-2. Of primary importance to this work is the selection of a set of defining sources to be used to orient the ICRF-2 axes. These sources should be as positionally stable as can be determined with existing data and analysis. It is well known that compact extragalactic sources have variable and unpredictable emission structures on scales larger than the accuracy of their position estimates. Temporal variations of the intrinsic structure of these objects results in apparent motion when astrometric observations are made at several epochs. Generation and analysis of position time series is one method to address this issue. Here we compare two methods for generation of position time series.

DTIC

Ion Cyclotron Radiation; Plasma Heating; Position (Location); Radio Frequency Heating; Time Series Analysis

20080041656 Naval Observatory, Washington, DC USA
Summary of the Discussion on the Prediction of Earth Orientation Parameters
Wooden, W; Sep 2007; 3 pp.; In English
Report No.(s): AD-A483861; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483861

This panel discussion took place after Session 4 entitled Prediction, Combination, and Geophysical Interpretation of Earth Orientation Parameters. The panel, drawn from the membership of the IERS Working Group on Prediction (WGP), represented a broad cross section of the Earth Orientation Parameter (EOP) prediction community. W. Wooden, the chairperson of the WGP, served as moderator for the discussion. He introduced the panel members and explained that the purpose was to solicit input and suggestions from the conference attendees on the topics that are being considered by the working group. To stimulate subsequent discussion, each panel member gave their view on critical issues that need to be resolved for progress to be made in EOP prediction.
DTIC
Earth Orientation; Independent Variables

20080041677 Naval Observatory, Washington, DC USA
Helical Magnetic Fields in the Jet of 3C 273
Zavala, R T; Taylor, G B; Giovannini, G; Jan 2007; 3 pp.; In English
Report No.(s): AD-A483916; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483916

Using the VLBA we confirm the presence of a Faraday rotation measure gradient transverse to the jet axis of 3C 273. A rotation measure gradient is expected to be the signature of a helical magnetic field wrapping around the relativistic jet.
DTIC
Blazars; Faraday Effect; Magnetic Field Configurations; Magnetic Fields; Quasars; Rotation

20080041833 Naval Observatory, Washington, DC USA
Accurate Optical Reference Catalogs
Zacharias, Norbert; Aug 2006; 2 pp.; In English
Report No.(s): AD-A484208; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This paper reviews current and near future all-sky astrometric catalogs on the International Celestial Reference Frame (ICRF) with an emphasis on reference star data at optical wavelengths for user applications.
DTIC
Astrometry; Celestial Reference Systems; Motion

20080042294 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Processing GPS Receiver Data for Improved Fermi GLAST Navigation
Woodard, Mark A.; October 07, 2008; 12 pp.; In English; AGI 2008 User's Conference, 7-9 Oct. 2008, Chicago, IL, USA; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080042294

Fermi GLAST s 5-year mission objectives: a) Explore the most extreme environments in the Universe. b) Search for signs of new laws of physics and what composes the mysterious Dark Matter. c) Explain how black holes accelerate immense jets of material to nearly light speed. d) Help crack the mysteries of gamma-ray bursts. e) Answer long-standing questions across a broad range of topics, including solar flares, pulsars and the origin of cosmic rays.
Derived from text
Global Positioning System; Fermi Gamma-Ray Space Telescope; Black Holes (Astronomy); Gamma Ray Bursts; Dark Matter; Solar Flares; Pulsars; Cosmic Rays

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

20080040827 Stanford Linear Accelerator Center, Menlo Park, CA, USA
Automated Science Processing for GLAST LAT Data
Chiang, J.; Carson, J.; Focke, W.; Oct. 2007; 2 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-918035; SLAC-PUB-12882; No Copyright; Avail.: Department of Energy Information Bridge

Automated Science Processing (ASP) will be performed by the GLAST Large Area Telescope (LAT) Instrument Science Operations Center (ISOC) on data from the satellite as soon as the Level 1 data are available in the ground processing pipeline. ASP will consist of time-critical science analyses that will facilitate follow-up and multi-wavelength observations of transient sources. These analyses include refinement of gamma-ray burst (GRB) positions, timing, flux and spectral properties, off-line searches for untriggered GRBs and gamma-ray afterglows, longer time scale monitoring of a standard set of sources (AGNs, X-ray binaries), and searches for previously unknown flaring sources in the LAT band. We describe the design of ASP and its scientific products; and we show results of a prototype implementation, driven by the standard LAT data processing pipeline, as applied to simulated LAT and GBM data.
NTIS
Gamma Rays; Telescopes

20080040833 Stanford Linear Accelerator Center, Stanford, CA, USA
Turbulence in the First Stars
Iocco, F.; Sep. 2007; 3 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-917273; SLAC-PUB-12796; No Copyright; Avail.: National Technical Information Service (NTIS)

We present preliminary results of 2-D simulations of the effects of turbulence in the mixing of Pair Instability Supernovae. We make use of the FLASH code to evolve initial 1-D models of post-bounce PISNe and seed turbulence in form of velocity perturbations. We identify the energetic and spatial scale for the turbulence to have mixing effects on the metal shells inside the star. Under the conditions we examine, we observe some mixing but the onion structure of the metal distribution is not disrupted.
NTIS
Supernovae; Turbulence; Stars

20080040835 Stanford Linear Accelerator Center, CA, USA
Cross-Correlation Weak Lensing of SDSS Galaxy Clusters 1: Measurements
Sheldon, E. S.; Johnston, D. E.; Scranton, R.; Koester, B. P.; McKay, T. A.; Sep. 2007; 16 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-917269; SLAC-PUB-12811; No Copyright; Avail.: National Technical Information Service (NTIS)

We interpret and model the statistical weak lensing measurements around 130,000 groups and clusters of galaxies in the Sloan Digital Sky Survey presented by Sheldon et al. (2007). We present non-parametric inversions of the 2D shear profiles to the mean 3D cluster density and mass profiles in bins of both optical richness and cluster i-band luminosity. Since the mean cluster density profile is proportional to the cluster-mass correlation function, the mean profile is spherically symmetric by the assumptions of large-scale homogeneity and isotropy. We correct the inferred 3D profiles for systematic effects, including non-linear shear and the fact that cluster halos are not all precisely centered on their brightest galaxies. We also model the measured cluster shear profile as a sum of contributions from the brightest central galaxy, the cluster dark matter halo, and neighboring halos. We infer the relations between mean cluster virial mass and optical richness and luminosity over two orders of magnitude in cluster mass; the virial mass at fixed richness or luminosity is determined with a precision of (approx.) 13% including both statistical and systematic errors. We also constrain the halo concentration parameter and halo bias as a function of cluster mass; both are in good agreement with predictions from N-body simulations of LCDM models. The methods employed here will be applicable to deeper, wide-area optical surveys that aim to constrain the nature of the dark energy, such as the Dark Energy Survey, the Large Synoptic Survey Telescope and space-based surveys.
NTIS
Cross Correlation; Dark Matter; Galactic Clusters; Sky Surveys (Astronomy)

20080040841 Stanford Univ., CA, USA; Stanford Linear Accelerator Center, CA, USA
Identifying Dark Matter Burners in the Galactic Center
Moskalenko, I. V.; Wai, L. L.; Apr. 2007; 2 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-902480; SLAC-PUB-12468; No Copyright; Avail.: Department of Energy Information Bridge

If the supermassive black hole (SMBH) at the center of our Galaxy grew adiabatically, then a dense 'spike' of dark matter is expected to have formed around it. Assuming that dark matter is composed primarily of weakly interacting massive particles (WIMPs), a star orbiting close enough to the SMBH can capture WIMPs at an extremely high rate. The stellar luminosity due to annihilation of captured WIMPs in the stellar core may be comparable to or even exceed the luminosity of the star due to thermonuclear burning. The model thus predicts the existence of unusual stars, i.e. 'WIMP burners', in the vicinity of an adiabatically grown SMBH. We find that the most efficient WIMP burners are stars with degenerate electron cores, e.g. white dwarfs (WD) or degenerate cores with envelopes. If found, such stars would provide evidence for the existence of particle dark matter and could possibly be used to establish its density profile. In our previous paper we computed the luminosity from WIMP burning for a range of dark matter spike density profiles, degenerate core masses, and distances from the SMBH. Here we compare our results with the observed stars closest to the Galactic center and find that they could be consistent with WIMP burners in the form of degenerate cores with envelopes.
NTIS
Burners; Dark Matter; Identifying

20080040918 Stanford Univ., Stanford, CA USA; Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, USA; Jagiellonian Univ., Cracow, Poland
Electron Energy Distributions at Relativistic Shock Sites: Observational Constraints from the Cygnus A Hotspots
Stawarzg, L.; Harris, D. E.; Ostrowski, M.; Oct. 2007; 5 pp.; In English
Report No.(s): DE2007-918018; SLAC-PUB-12863; No Copyright; Avail.: National Technical Information Service (NTIS)

We report new detections of the hotspots in Cygnus A at 5.5 and 8.0 microns with the Spitzer Space Telescope. Together with detailed published radio observations and synchrotron self-Compton modeling of previous X-ray detections, we reconstruct the underlying electron energy spectra of the two brightest hotspots.
NTIS
Electron Energy; Energy Distribution; Radio Galaxies

20080040919 Stanford Univ., Stanford, CA USA; Jagiellonian Univ., Cracow, Poland; Poona Univ., India; Istituto di Radioastronomia, Bologna, Italy
Recurrent Activity in Radio Galaxies
Jamrozy, M.; Konar, C.; Machalski, J.; Mack, K. H.; Saikia, D. J.; Oct. 2007; 4 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-918017; SLAC-PUB-12864; No Copyright; Avail.: Department of Energy Information Bridge

One of the outstanding issues concerning extragalactic radio sources is the total duration of their active phase and the possible existence of duty cycles of their nuclear activity. A duty cycle can be recognized if there is a mechanism which preserves the information of past activity for a sufficiently long time after a new activity has started up. If a new cycle starts before the radio lobes created during a former activity period have faded, we can recognize this by the observations of a young radio source embedded in an old relic structure.
NTIS
Radio Galaxies; Extragalactic Radio Sources; Cycles

20080040932 Stanford Linear Accelerator Center, CA, USA; Ohio Univ., Athens, OH, USA
Probing AGN Broad Line Regions with LAT Observations of FSRQs
Carson, J. E.; Chiang, J.; Bottcher, M.; January 2007; 2 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-917738; SLAC-PUB-12879; No Copyright; Avail.: National Technical Information Service (NTIS)

The GLAST Large Area Telescope (LAT) is expected to detect gamma-ray emission from over a thousand active galaxies, many of which will be flat spectrum radio quasars (FSRQs). A commonly assumed ingredient of leptonic models of FRSQs is the contribution to the gamma-ray flux from external inverse-Compton (EIC) scattering of photons from the broad line

region (BLR) material by relativistic electrons and positrons in the jet. Here we explore the effect of the BLR geometry on the high-energy emission from FSRQs
NTIS
Quasars; Spectra; Telescopes

20080040933 Ohio Univ., Athens, OH, USA; Kavli Inst. for Particle Astrophysics and Cosmology, Menlo Park, CA, USA; Stanford Univ., Stanford, CA USA
Analysis Methods for Milky Way Dark Matter Halo Detection
Sander, A.; Wai, L.; Winer, B.; Moskalenko, I. V.; January 2007; 2 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-917727; SLAC-PUB-12876; No Copyright; Avail.: Department of Energy Information Bridge

We present methods for the analysis of dark matter annihilation in the smooth halo of the Milky Way galaxy. We model the diffuse gamma-ray background using GALPROP, and model the halo using an NFW prole and the gamma-ray spectrum for WIMP pair annihilation. We plan to combine these models with the point source catalog and a simple model for the extragalactic gamma ray background. Using the downhill simplex method to converge on the maximum likelihood value, we can vary key parameters in these models and fit them to the gamma-ray data. Through the use of the Markov Chain Monte Carlo (MCMC) method we can then map out the likelihood as a function of the model parameters to estimate the correlated errors on these parameters.
NTIS
Dark Matter; Halos; Milky Way Galaxy

20080041252 Naval Observatory, Washington, DC USA
Selecting Defining Sources for the Next ICRF Based on Source Structure
Charlot, P; Fey, A L; Collioud, A; Ojha, R; Boboltz, D A; Camargo, J I; Sep 2007; 5 pp.; In English; Original contains color illustrations
Report No.(s): AD-A483467; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The intrinsic radio structure of the extragalactic sources is one of the limiting errors in the definition of the International Celestial Reference Frame (ICRF). This paper reports about the ongoing work to monitor the structural evolution of the ICRF sources by using the Very Long Baseline Array and other VLBI telescopes around the world. Based on more than 5000 VLBI images produced from such observations, we have assessed the astrometric suitability of 80% of the ICRF sources. The number of VLBI images for a given source varies from 1 for the least-observed sources to more than 20 for the intensively-observed sources. From this analysis, we identify a subset of 194 sources that are highly compact at any of the available epochs. Such sources are prime candidates to define the next ICRF with the highest accuracy.
DTIC
Ion Cyclotron Radiation; Plasma Heating; Radio Astronomy; Radio Frequency Heating

20080041334 Naval Research Lab., Washington, DC USA
Preliminary Global Radiation Belt Formation and Prediction Model
Keskinen, Michael J; Jun 25, 2008; 28 pp.; In English
Contract(s)/Grant(s): Proj-67-9387-F7
Report No.(s): AD-A483660; NRL/MR/6750--08-9122; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A computational model for the time-dependent dynamics of the electron and ion terrestrial radiation belts has been developed. The model solves the fundamental bounce-averaged electron and ion modified Boltzmann Fokker-Planck equations for energy, pitch angle, and L-shell. The code has been applied to broadband whistler turbulence and found to be consistent with empirical models of radiation belt dynamics.
DTIC
Mathematical Models; Radiation Belts

20080041544 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Binary Black Holes, Gravitational Waves, and Numerical Relativity
Centrella, Joan; [2008]; 1 pp.; In English; High Energy Seminar, 31 Oct. 2008, Amhert, MA, USA; No Copyright; Avail.: Other Sources; Abstract Only

The final merger of two black holes releases a tremendous amount of energy and is one of the brightest sources in the

gravitational wave sky. Observing these sources with gravitational wave detectors requires that we know the radiation waveforms they emit. Since these mergers take place in regions of very strong gravitational fields, we need to solve Einstein's equations of general relativity on a computer in order to calculate these waveforms. For more than 30 years, scientists have tried to compute these waveforms using the methods of numerical relativity. The resulting computer codes have been plagued by instabilities, causing them to crash well before the black holes in the binary could complete even a single orbit. Recently this situation has changed dramatically, with a series of amazing breakthroughs. This talk will take you on this quest for the holy grail of numerical relativity, showing how a spacetime is constructed on a computer to build a simulation laboratory for binary black hole mergers. We will focus on the recent advances that are revealing these waveforms, and the dramatic new potential for discoveries that arises when these sources will be observed by LIGO and LISA.
Author
Black Holes (Astronomy); Gravitational Waves; Relativity; Astrophysics; Computerized Simulation; Space-Time Functions

20080041695 Massachusetts Inst. of Tech., Cambridge, MA USA
Advanced Electrodynamic Tether Systems: Modeling of Scattering and Unsteady Effects
Martinez-Sanchez, Manuel; Batishchev, Oleg; Jun 6, 2008; 240 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-05-1-0380
Report No.(s): AD-A483974; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA483974

This work addresses the needs for advanced computational tools and theoretical models devoted to the study of two interrelated topics of interest to the Air Force: Radiation Belt Remediation (RBR) and potential use of tethers as low frequency oscillators/radiators. Both problems stretch the capabilities of existing numerical methods, while connecting with a body of previous work on probe theory, spacecraft-plasma interactions and electrodynamic tether propulsion. The Electrostatic RBR application would typically require MV-level potentials and complex, multi-strand wire arrangements. The high voltages imply extreme disparity of length scales, as well as relativistic conditions in some cases. The geometrical complexity and driving physical processes may require 3D capabilities, particularly when magnetic effects cannot be ignored. For its part, the study of sheath ion or electron oscillations in the vicinity of a high power radiating tether requires tracking of a time-dependent sheath boundary and use of boundary conditions that allow radiation escape while denying spurious reflections.
DTIC
Aerospace Environments; Electrostatics; Magnetospheres; Mathematical Models; Radiation Belts; Scattering; Tethering

20080041724 Naval Research Lab., Washington, DC USA
A Model for Solar Coronal Mass Ejections
Antiochos, S K; DeVore, C R; Klimchuk, J A; Jan 1999; 34 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484085; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484085

We propose a new model for the initiation of a solar coronal mass ejection (CME). The model agrees with two properties of CMEs and eruptive flares that have proved to be very difficult to explain with previous models: (a) Very low-lying magnetic field lines, down to the photospheric neutral line, can open toward infinity during an eruption. (b) The eruption is driven solely by magnetic free energy stored in a closed, sheared arcade; consequently, the magnetic energy of the closed state is well above that of the post-eruption open state. The key new feature of our model is that CMEs occur in multi-polar topologies, in which reconnection between a sheared arcade and neighboring flux systems triggers the eruption. In this 'magnetic breakout' model, reconnection removes the unsheared field above the low-lying, sheared core flux near the neutral line, thereby allowing this core flux to burst open. We present numerical simulations which demonstrate that our model can account for the energy requirements for CMEs. We discuss the implication of the model for CME/flare prediction.
DTIC
Coronal Mass Ejection; Mathematical Models; Solar Corona

20080041726 Naval Research Lab., Washington, DC USA
The Role of Helicity in Magnetic Reconnection: 3D Numerical Simulations
Antiochos, Spiro K; DeVore, C R; Jan 1999; 22 pp.; In English; Original contains color illustrations
Report No.(s): AD-A484087; No Copyright; Avail.: Defense Technical Information Center (DTIC)
ONLINE: http://hdl.handle.net/100.2/ADA484087

We demonstrate that conservation of global helicity plays only a minor role in determining the nature and consequences

of magnetic reconnection in the solar atmosphere. First, we show that observations of the solar coronal magnetic field are in direct conflict with Taylor's theory. Next, we present results from three-dimensional MHD simulations of the shearing of bipolar and multi-polar coronal magnetic fields by photospheric footpoint motions, and discuss the implications of these results for Taylor's theory and for models of solar activity. The key conclusion of this work is that significant magnetic reconnection occurs only at very specific locations and, hence the Sun's magnetic field cannot relax completely down to the minimum energy state predicted by conservation of global helicity.
DTIC
Magnetic Field Reconnection; Magnetic Fields; Simulation; Solar Atmosphere

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LUNAR AND PLANETARY SCIENCE AND EXPLORATION

Includes planetology; selenology; meteorites; comets; and manned and unmanned planetary and lunar flights. For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance*.

20080040800 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Titan Surface Temperatures from Cassini CIRS
Jennings, Donald E.; Flasar, F.M.; Kundle, V.G.; Samuelson, R.E.; Pearl, J.C.; Nixon, C.A.; Carlson, R.C.; Mamoutkine, A.A.; Brasunas, J.C.; Guandique, E.; Achterberg, R.K.; Bjoraker, M.H.; Romani, P.N.; Segura, M.E.; Albright, S.A.; Elliott, M.H.; Tingley, J.S.; Calcutt, S.; Coustenis, A.; Bezard, B.; Courtin, R.; October 09, 2008; 1 pp.; In English; 40th Annual Meeting of the Division for Planetary Sciences of the American Astronomical Society, 10 - 15 Oct. 2008, Ithaca, New York, USA; Copyright; Avail.: Other Sources; Abstract Only

Thermal radiation from the surface of Titan reaches space through a spectral window at 19-microns wavelength. After removing the effects of the atmosphere, measurement of this radiance gives the brightness temperature of the surface. The Composite Infrared Spectrometer (CIRS) has made such measurements during the Cassini prime mission. These observations cover a wide range of emission angles, thereby constraining the contributions from atmospheric radiance and opacity. With the more complete latitude coverage and much larger dataset, we have been able to improve upon the original results from Voyager IRIS. CIRS measures an equatorial surface brightness temperature, averaged over longitude, of 93.7 +/- 0.6 K. This agrees with the HASI temperature at the Huygens landing site. The latitude dependence of surface brightness temperature exhibits an approximately 2 K decrease toward the South Pole and 3 K decrease toward the North Pole. The lower surface temperatures seen at high latitudes are consistent with conditions expected for lake formation.
Author
Titan; Titan Atmosphere; Surface Temperature; Brightness Temperature; Thermal Radiation; Cassini Mission; Infrared Spectrometers

20080040801 NASA Goddard Space Flight Center, Greenbelt, MD, USA
The 2008 Passage of Jupiter's Great Red Spot and Oval BA as Observed from Hubble/WFPC2
Simon-Miller, Amy A.; Chanover, N. J.; Orton, G. S.; Tsavaris, I.; October 08, 2008; 1 pp.; In English; CIRS Team Meeting/AAS Division of Planetary Sciences meeting, 8-15 Oct. 2008, Ithaca, NY, USA
Contract(s)/Grant(s): NAS5-26555; Copyright; Avail.: Other Sources; Abstract Only

Hubble Space Telescope data of the passage of Jupiter's Great Red Spot (GRS) and Oval BA were acquired on May 15, June 28 (near closest approach), and July 8. Wind fields were measured from Wide Field Planetary Camera 2 (WFPC2) data with 10-hour separations before and after closest approach, and within the GRS with 40-minute separations on all three dates. Color information was also derived using 8 narrowband WFPC2 filters from 343 to 673-nm on all three dates. We will present the results of principal components and wind analyses and discuss unique features seen in this data set. In addition, we will highlight any changes observed in the GRS, Oval BA and their surroundings as a result of the passage, including the movement of a smaller red anticyclone from west of the GRS, around its southern periphery, and to the east of the GRS.
Author
Jupiter Red Spot; Jupiter Atmosphere; Hubble Space Telescope

20080040993 Arizona State Univ., Tempe, AZ, USA
Global Geologic Mapping of Io: Preliminary Results
Williams, David A.; Keszthelyi, L. P.; Crown, D. A.; Geissler, P. E.; Schenk, P. M.; Yff, Jessica; Jaeger, W. L.; Rathbun, J. A.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

A new global geologic map of Jupiter's volcanic moon, Io is being prepared, with the focus being on completion of a draft

map by July 2008. Here initial results of the mapping are reported: a preliminary distribution of material units in terms of areas and a visual representation. Additionally, the mapping hopes to address some of the problems in Io geology. Thus far it has been discovered that Io's surface is dominated by plains material, thought to consist of Io's silicate crust covered by pyroclastic deposits and lava flows of silicate and sulfur-bearing composition. Many plains areas contain flow fields that cannot be mapped separately due to a lack of resolution or modification by alteration processes. Discrete lava flows and flow fields are the next most abundant unit, with bright (sulfur?) flows in greater abundance than dark (silicate?) flows. The source of most of Io's heat flow, the paterae, are the least abundant unit in terms of areal extent.Upon completion of the draft map for peer review, it will be used to investigate several specific questions about the geological evolution of Io that previously could not be well addressed, including: comparison of the areas versus the heights of Ionian mountains to assess their stability and evolution; correlation and comparison of Galileo Near-Infrared Mapping Spectrometer and Photopolarimeter-Radiometer hot spot locations with the mapped location of dark versus bright lava flows and patera floors to assess any variations in the types of sources for Io's active volcanism; and the creation of a global inventory of the areal coverage of dark and bright laval flows to assess the relative importance of sulfur versus silicate volcanism in resurfacing Io, and to assess whether there are regional concentrations of either style of volcanism that may have implications on interior processes.
Derived from text
Geological Surveys; Io; Photomapping; Thematic Mapping; Composition (Property); Characteristics

20080040995 Proxemy Research, Inc., Laytonsville, MD, USA
Geologic Mapping of V-19, V-28, and V-53
Stofan, E. R.; Martin, P.; Guest, J. E.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Copyright; Avail.: CASI: A01, Hardcopy

The Sedna Planitia Quadrangle (V-19) extend from 25 deg N - 50 deg N latitude, 330 deg - 0 deg longitude. The quadrangle contains the northern-most portion of western Eistla Regio and the Sedna Planitia lowlands. Geologic maps of Sedna Planitia (V-199), Hecate Chasma (V-28) quadrangles have been completed at the 1:5,000,000 scale as part of the NASA Planetary Geologic Mapping Program. All quadrangles (V-53, V-28 and V-19) have been reviewed at lease once and will be resubmitted. In V-28 and V-53, more plains materials units have been mapped than in previously mapped quadrangles V-46 and V-39. V-19 is more comparable to these latter maps in terms of numbers of plains units. In V-28, all of the plains materials units to the south of the rift have an unusually high concentration of volcanic edifices, which both predate and postdate the units. A similar situation is seen in V-53 and V-19, where small edifice formation is not confined to any specific time period. In the two chasma-related quadrangles, coronae are located along the rift, as well as to the north and the south of the rifts. Coronae in both quadrangles exhibit all forms of corona topographic shapes, including depressions, rimmed depressions, plateaus and domes. In V-28 and V-53, some coronae along the rift do not have much associated volcanism; coronae with the most volcanism in these quadrangles are located at least 500 km off the rifts or on the Themis Regio highland. All three quadrangles have very horizontal stratigraphic columns, as limited contact between units prevents clear age determinations. While this results in the appearance that all units formed at the same time, the use of hachured columns for each unit illustrates the limited nature of our stratigraphic knowledge in these quadrangles, allowing for numerous possible geologic histories. The scale of resurfacing in these quadrangles is on the scale of 100s of kilometers, consistent with the fact that they lie in the most volcanic region of Venus.
Derived from text
Geological Surveys; Mapping; Venus (Planet); Planetary Geology

20080040997 Buffalo Univ., NY, USA
Geologic Mapping of the Marius Quadrangle, the Moon
Gregg, Tracy K. P.; Yingst, Aileen; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The authors seek to construct a 1:2,500,000-scale map of Lunar Quadrangle 10 (LQ10 or the Marius Quadrangle) to address outstanding questions about the Moon's volcanologic history and the role of impact basins in lunar geologic evolution. The selected quadrangle contains Aristarchus plateau and the Marius hills, Reiner Gamma, and Hevelius crater. By generating a geologic map of this region, we can constrain the temporal (and possibly genetic) relations between these features, revealing more information about the Moon's chemical and thermal evolution. Although many of these individual sites have been investigated using Lunar Orbiter, Clementine, Lunar Prospector and Galileo data, no single investigation has yet attempted to constrain the stratigraphic and geologic relationships between these features. Furthermore, we will be able to compare our unit boundaries on the eastern boundary of the proposed map area with those already mapped in the Copernicus Quadrangle.

Geologic mapping of the Marius Quadrangle would provide insight to the following questions: the origin, evolution, and distribution of mare volcanism; the timing and effects of the major basin-forming impacts on lunar crustal stratigraphy; and, the Moon's important resources, where they are concentrated, and how they can be accessed.
Derived from text
Geological Surveys; Mapping; Lunar Geology; Volcanology; Hypervelocity Impact; Structural Basins; Lunar Evolution; Moon

20080041002 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Global Geologic Map of Europa
Doggett, T.; Figueredo, P.; Greeley, R.; Hare, T.; Kolb, E.; Mullins, K.; Senske, D.; Tanaka, K.; Weiser, S.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Europa, with its indications of a sub-ice ocean, is of keen interest to astrobiology and planetary geology. Knowledge of the global distribution and timing of Europan geologic units is a key step for the synthesis of data from the Galileo mission, and for the planning of future missions to the satellite. The first geologic map of Europa was produced at a hemisphere scale with low resolution Voyager data. Following the acquisition of higher resolution data by the Galileo mission, researchers have identified surface units and determined sequences of events in relatively small areas of Europa through geologic mapping using images at various resolutions acquired by Galileo's Solid State Imaging camera. These works provided a local to subregional perspective and employed different criteria for the determination and naming of units. Unified guidelines for the identification, mapping and naming of Europan geologic units were put forth by and employed in regional-to-hemispheric scale mapping which is now being expanded into a global geologic map. A global photomosaic of Galileo and Voyager data was used as a basemap for mapping in ArcGIS, following suggested methodology of all-stratigraphy for planetary mapping. The following units have been defined in global mapping and are listed in stratigraphic order from oldest to youngest: ridged plains material, Argadnel Regio unit, dark plains material, lineaments, disrupted plains material, lenticulated plains material and Chaos material.
Derived from text
Geological Surveys; Europa; Planetary Surfaces; Planetary Geology; Petrology; Jupiter (Planet)

20080041010 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Material Units, Structures/Landforms, and Stratigraphy for the Global Geologic Map of Ganymede (1:15M)
Patterson, G. Wesley; Head, James W.; Collins, Geoffrey C.; Pappalardo, Robert T.; Prockter, Louis M.; Lucchitta, Baerbel K.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

In the coming year a global geological map of Ganymede will be completed that represents the most recent understanding of the satellite on the basis of Galileo mission results. This contribution builds on important previous accomplishments in the study of Ganymede utilizing Voyager data and incorporates the many new discoveries that were brought about by examination of Galileo data. Material units have been defined, structural landforms have been identified, and an approximate stratigraphy has been determined utilizing a global mosaic of the surface with a nominal resolution of 1 km/pixel assembled by the USGS. This mosaic incorporates the best available Voyager and Galileo regional coverage and high resolution imagery (100-200 m/pixel) of characteristic features and terrain types obtained by the Galileo spacecraft. This map has given us a more complete understanding of: 1) the major geological processes operating on Ganymede, 2) the characteristics of the geological units making up its surface, 3) the stratigraphic relationships of geological units and structures, and 4) the geological history inferred from these relationships. A summary of these efforts is provided here.
Derived from text
Geological Surveys; Ganymede; Landforms; Stratigraphy; Structural Properties (Geology)

20080041014 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Geologic Mapping of the Juno Chasma Quadrangle, Venus: Establishing the Relation Between Rifting and Volcanism
Senske, D. A.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

To understand the spatial and temporal relations between tectonic and volcanic processes on Venus, the Juno Chasma

region is mapped. Geologic units are used to establish regional stratigraphic relations and the timing between rifting and volcanism.
Derived from text
Geological Surveys; Mapping; Venus (Planet); Geological Faults; Volcanology; Tectonics

20080041015 Geological Survey, Flagstaff, AZ, USA
Geologic Evolution of the Martian Highlands: MTMs -20002, -20007, -25002, and -25007
Fortezzo, C. M.; Williams, K. K.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

As part of a continuing study to understand the relationship between valleys and highland resurfacing through geologic mapping, the authors are continuing to map seven 1:500,000-scale MTM quads in portions of the Margaritifer, Arabia, and Noachis Terrae. Results from this mapping will also help constrain the role and extent of past water in the region. The MTMs are grouped in two different areas within the region and compliment previous mapping in adjacent areas. Three western quads focus on Jones crater and the Himera, Samara, and Loire Valles systems. This abstract focuses on the four eastern quads wherein a large, ancient impact structure, Noachis basin, is flanked on its south and east by a series of valley networks. A solitary valley drains this basin and stretches north-northeast for approximately 450 km, transporting materials into Arabia Terra. Pertinent raster and vector data have been imported and registered using ESRI's ArcMap GIS software. To inspect and quantify stratigraphic relations, crater counts are being compiled in ESRI's ArcView GIS software to make use of crater counting tools specifically developed for planetary mappers. New datasets from the Mars Reconnaissance Orbiter including 4 CTX images, 31 CRISM multi-spectral pushbroom images, and 4 HiRISE images were incorporated into the project during the third year. The CRISM dataset uses summary parameters with thresholds to select targets for the high-resolution datasets. The befit for mappers is the extensive coverage and general compositional information. Results of a cursory analysis show strong mafic absorptions on the floors of Peta crater and Noachis basin. LCP absorptions occur more often than olivine, however, olivine tends to be denser than both pyroxenes. Olivine and HCP mat indicate relatively younger rocks, which is supported by the occurrence of wrinkle ridges associated with high olivine and HCP absorptions in the Peta crater and Noachis basin floors.
Derived from text
Geological Surveys; Valleys; Highlands; Mars (Planet); Planetary Surfaces; Planetary Geology; Petrology

20080041020 Hawaii Univ., Honolulu, HI, USA
Geologic Mapping of the Martian Impact Crater Tooting
Mouginis-Mark, Peter; Boyce, Joseph M.; Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; June 2008; 2 pp.; In English; See also 20080040988; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Tooting crater is approximately 29 km in diameters, is located at 23.4 deg N, 207.5 deg E and is classified as a multi-layered ejecta crater. Tooting crater is a very young crater, with an estimated age of 700,000 to 2M years. The crater formed on virtually flat lava flows within Amazonis Planitia where there appears to have been no major topographic features prior to the impact, so that we can measure ejecta thickness and cavity volume. In the past 12 months, the authors have: published their first detailed analysis of the geometry of the crater cavity and the distribution of the ejecta layers; refined the geologic map of the interior of Tooting crater through mapping of the cavity at a scale of 1:1100K; and continued the analysis of an increasing number of high resolution images obtained by the CTX and HiRISE instruments. Currently the authors seek to resolve several science issues that have been identified during this mapping, including: what is the origin of the lobate flows on the NW and SW rims of the crater?; how did the ejecta curtain break apart during the formation of the crater, and how uniform was the emplacement process for the ejecta layers; and, can we infer physical characteristics about the ejecta? Future study plans include the completion of a draft geologic map of Tooting crater and submission of it to the U.S. Geological survey for a preliminary review, publishing a second research paper on the detailed geology of the crater cavity and the distribution of the flows on the crater rim, and completing the map text for the 1:100K geologic map description of units at Tooting crater.
Derived from text
Mars Craters; Geological Surveys; Mapping

20080041528 NASA Glenn Research Center, Cleveland, OH, USA

Adsorption of Water on Simulated Moon Dust Samples

Goering, John P.; Sah, Shweta; Burghaus, Uwe; Street, Kenneth W., Jr.; September 2008; 18 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NNX07AK91A; WBS 936374.03.03.03

Report No.(s): NASA/TM-2008-215279; E-16559; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080041528

A lunar regolith simulant dust sample (JSC-1a) supported on a silica wafer (SiO2/Si(111)) has been characterized by scanning electron microscopy (SEM), energy dispersive x-ray spectroscopy (EDX), and Auger electron spectroscopy (AES). The adsorption kinetics of water has been studied primarily by thermal desorption spectroscopy (TDS) and also by collecting isothermal adsorption transients. The support has been characterized by water TDS. JSC-1a consists mostly of aluminosilicate glass and other minerals containing Fe, Na, Ca, and Mg. The particle sizes span the range from a few microns up to 100 microns. At small exposures, H2O TDS is characterized by broad (100 to 450 K) structures; at large exposures distinct TDS peaks emerge that are assigned to amorphous solid water (145 K) and crystalline ice (165 K). Water dissociates on JSC-1a at small exposures but not on the bare silica support. It appears that rather porous condensed ice layers form at large exposures. At thermal impact energies, the initial adsorption probability amounts to 0.92+/-0.05.

Author

Adsorption; Lunar Rocks; Regolith; Silicon Dioxide; Scanning Electron Microscopy; Desorption; Thermal Energy

20080041557 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Use of a Lunar Outpost for Developing Space Settlement Technologies

Purves, Lloyd R.; September 09, 2008; 11 pp.; In English; AIAA Space 2008 Conference, 9-11 Sep. 2008, San Diego, CA, USA; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080041557

The type of polar lunar outpost being considered in the NASA Vision for Space Exploration (VSE) can effectively support the development of technologies that will not only significantly enhance lunar exploration, but also enable long term crewed space missions, including space settlement. The critical technologies are: artificial gravity, radiation protection, Closed Ecological Life Support Systems (CELSS) and In-Situ Resource Utilization (ISRU). These enhance lunar exploration by extending the time an astronaut can remain on the moon and reducing the need for supplies from Earth, and they seem required for space settlement. A polar lunar outpost provides a location to perform the research and testing required to develop these technologies, as well as to determine if there are viable countermeasures that can reduce the need for Earth-surface-equivalent gravity and radiation protection on long human space missions. The types of spinning space vehicles or stations envisioned to provide artificial gravity can be implemented and tested on the lunar surface, where they can create any level of effective gravity above the ~1/6 Earth gravity that naturally exists on the lunar surface. Likewise, varying degrees of radiation protection can provide a natural radiation environment on the lunar surface less than or equal to ~1/2 that of open space at 1 AU. Lunar ISRU has the potential of providing most of the material needed for radiation protection, the centrifuge that provides artificial gravity; and the atmosphere, water and soil for a CELSS. Lunar ISRU both saves the cost of transporting these materials from Earth and helps define the requirements for ISRU on other planetary bodies. Biosphere II provides a reference point for estimating what is required for an initial habitat with a CELSS. Previous studies provide initial estimates of what would be required to provide such a lunar habitat with the gravity and radiation environment of the Earth s surface. While much preparatory work can be accomplished with existing capabilities such as the ISS, the full implementation of a lunar habitat with an Earth-like environment will require the development of a lunar mission architecture that goes beyond VSE concepts. The proven knowledge of how to build such a lunar habitat can then be applied to various approaches for space settlement.

Author

Radiation Protection; Artificial Gravity; Closed Ecological Systems; Life Support Systems; Lunar Exploration; Habitats; Lunar Bases; Space Exploration; Aerospace Engineering

20080041597 NASA Langley Research Center, Hampton, VA, USA

A Planetary Protection Strategy for the Mars Aerial Regional-Scale Environmental Survey (ARES) Mission Concept

Kuhl, Christopher A.; August 2008; 41 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 698671.02.07.02.01

Report No.(s): NASA/TM-2008-215344; L-19353; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20080041597

The Aerial Regional-scale Environmental Survey (ARES) is a Mars exploration mission concept designed to send an

airplane to fly through the lower atmosphere of Mars, with the goal of taking scientific measurements of the atmosphere, surface, and subsurface phenomenon. ARES was first proposed to the Mars Scout program in December 2002 for a 2007 launch opportunity and was selected to proceed with a Phase A study, step-2 proposal which was submitted in May 2003. ARES was not selected for the Scout mission, but efforts continued on risk reduction of the atmospheric flight system in preparation for the next Mars Scout opportunity in 2006. The ARES concept was again proposed in July 2006 to the Mars Scout program but was not selected to proceed into Phase A. This document describes the Planetary Protection strategy that was developed in ARES Pre Phase-A activities to help identify, early in the design process, certain hardware, assemblies, and/or subsystems that will require unique design considerations based on constraints imposed by Planetary Protection requirements. Had ARES been selected as an exploration project, information in this document would make up the ARES Project Planetary Protection Plan.
Author
Mars Exploration; Mission Planning; Planetary Protection; Environmental Surveys; Design Analysis

20080042297 NASA Langley Research Center, Hampton, VA, USA
Analysis of Logistics in Support of a Human Lunar Outpost
Cirillo, William; Earle, Kevin; Goodliff, Kandyce; Reeves, j. D.; Andrashko, Mark; Merrill, R. Gabe; Stromgren, Chel; September 17, 2008; 10 pp.; In English; The International Workshop on Modeling and Applied Simulation, 17-19 Sep. 2008, Briatico, Italy; Original contains color illustrations
Contract(s)/Grant(s): WBS 604746.02.24.02.01.01.04; Copyright; Avail.: CASI: A02, Hardcopy

Strategic level analysis of the integrated behavior of lunar transportation system and lunar surface system architecture options is performed to inform NASA Constellation Program senior management on the benefit, viability, affordability, and robustness of system design choices. This paper presents an overview of the approach used to perform the campaign (strategic) analysis, with an emphasis on the logistics modeling and the impacts of logistics resupply on campaign behavior. An overview of deterministic and probabilistic analysis approaches is provided, with a discussion of the importance of each approach to understanding the integrated system behavior. The logistics required to support lunar surface habitation are analyzed from both 'macro-logistics' and 'micro-logistics' perspectives, where macro-logistics focuses on the delivery of goods to a destination and micro-logistics focuses on local handling of re-supply goods at a destination. An example campaign is provided to tie the theories of campaign analysis to results generation capabilities.
Author
Lunar Bases; Lunar Logistics; Logistics Management; Mission Planning

20080042389 NASA Glenn Research Center, Cleveland, OH, USA
Extraction of Thermal Performance Values from Samples in the Lunar Dust Adhesion Bell Jar
Gaier, James R.; Siamidis, John; Larkin, Elizabeth M. G.; October 20, 2008; 10 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 119103.04.05.04; Copyright; Avail.: CASI: A02, Hardcopy

A simulation chamber has been developed to test the performance of thermal control surfaces under dusty lunar conditions. The lunar dust adhesion bell jar (LDAB) is a diffusion pumped vacuum chamber (10(exp -8) Torr) built to test material samples less than about 7 cm in diameter. The LDAB has the following lunar dust simulant processing capabilities: heating and cooling while stirring in order to degas and remove adsorbed water; RF air-plasma for activating the dust and for organic contaminant removal; RF H/He-plasma to simulate solar wind; dust sieving system for controlling particle sizes; and a controlled means of introducing the activated dust to the samples under study. The LDAB is also fitted with an in situ Xe arc lamp solar simulator, and a cold box that can reach 30 K. Samples of thermal control surfaces (2.5 cm diameter) are introduced into the chamber for calorimetric evaluation using thermocouple instrumentation. The object of this paper is to present a thermal model of the samples under test conditions and to outline the procedure to extract the absorptance, emittance, and thermal efficiency from the pristine and sub-monolayer dust covered samples.
Author
Lunar Dust; Thermodynamic Efficiency; Temperature Effects; Control Surfaces; Adhesion; Vacuum Chambers; Temperature Control; Degassing; Contaminants; Emittance; Absorptance

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SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots. For related information see *93 Space Radiation*.

20080041582 NASA Goddard Space Flight Center, Greenbelt, MD, USA
SWCX Emission from the Helium Focusing Cone - Preliminary Results
Snowden, S. L.; Kuntz, K. D.; Collier, M. R.; [2008]; 5 pp.; In English; No Copyright; Avail.: CASI: A01, Hardcopy
ONLINE: http://hdl.handle.net/2060/20080041582

Preliminary results from an XMM-Newton campaign to study solar wind charge exchange (SWCX) emission from the heliospheric focusing cone of interstellar helium are presented. The detections of enhanced O VII and O VIII emission from the cone are at the 2(sigma) and 4(sigma) levels. The solar wind charge exchange (SWCX) emission in the heliosphere not associated with distinct objects (e.g., comets and planets including exospheric material in and near Earth s magnetosheath) is proportional to the flux of the solar wind and the space density of neutral material. The neutral material originates in the interstellar medium (ISM) and passes through the solar system due to the relative motion of the Sun and the ISM. The flow of the neutral material through the solar system is strongly perturbed by the Sun both by gravity and by radiation pressure. Because of the relative radiative scattering cross sections and the effect of solar gravitation the density of interstellar hydrogen near the Sun is reduced while interstellar helium is gravitationally focused. This creates a helium focusing cone downstream of the Sun [e.g., 1, and references therein].
Author
Solar Wind; Charge Exchange; Heliosphere; Gas Density; Interstellar Gas

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SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth radiation belts. For biological effects of radiation on plants and animals see *51 Life Sciences*; on human beings see 52 Aerospace Medicine. For theory see *73 Nuclear Physics*.

20080040823 Stanford Univ., Stanford, CA USA; North Carolina State Univ., Raleigh, NC USA
Simulation of Cosmic Ray Acceleration, Propagation and Interaction in SNR Environment
Lee, S. H.; Kamae, T.; Ellison, D. C.; January 2007; 2 pp.; In English
Contract(s)/Grant(s): DE-AC02-76SF00515
Report No.(s): DE2007-918043; SLAC-PUB-12880; No Copyright; Avail.: National Technical Information Service (NTIS)

This work aims to develop a highly flexible platform for 3D SNR hydro and cosmic ray (CR) simulation, which is easily expandable to accept new physics, and adaptable to the complex environments of individual supernova remnants. As a preliminary work in progress, the simulation is tested under toy model configurations, in a cubic mesh with a relatively low resolution (21x21x21 binning). Several assumptions and simplifications are made in the physics of cosmic ray acceleration and diffusion. Once the framework becomes mature, however, we can immediately proceed to perform realistic modeling of any given SNR, match in broad-band with observations, and extract useful information.
NTIS
Cosmic Rays; Simulation

20080041055 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Model for Cumulative Solar Heavy Ion Energy and LET Spectra
Xapsos, Mike; Barth, Janet; Stauffer, Craig; Jordan, Tom; Mewaldt, Richard; July 23, 2007; 7 pp.; In English; IEEE Nuclear and Space Radiation Effects Conference (NSREC) Technical Session, 23-27 Jul. 2007, Honolulu, HI, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy

A probabilistic model of cumulative solar heavy ion energy and lineary energy transfer (LET) spectra is developed for spacecraft design applications. Spectra are given as a function of confidence level, mission time period during solar maximum and shielding thickness. It is shown that long-term solar heavy ion fluxes exceed galactic cosmic ray fluxes during solar maximum for shielding levels of interest. Cumulative solar heavy ion fluences should therefore be accounted for in single event effects rate calculations and in the planning of space missions.
Author
Solar Energy; Linear Energy Transfer (LET); Heavy Ions; Solar Spectra; Solar Activity Effects; Single Event Upsets; Solar Radiation Shielding; Spacecraft Shielding; Spacecraft Design

20080042426 NASA Johnson Space Center, Houston, TX, USA

Ionizing Radiation as a Carcinogen, Chapter 11

Jones, Jeffrey A.; Casey, Rachel; Karouia, Fathi; Garte, Seymour; [2008]; 103 pp.; In English; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

Ionizing radiation is generally considered any form of radiation exposure that will produce a subatomic ionization event. Ionizing radiation may be in the form of either electromagnetic waves or particles, however must be of sufficient energy to cause ionization in the target molecule. For electromagnetic radiation (EMR), the wavelength is usually shorter and therefore energy higher, than for non-ionizing radiation; thus ionizing radiation is more likely to produce a biological effect. Ultraviolet (UV) EMR is intermediate in wavelength and energy, and is typically considered non-ionizing; however it clearly is mutagenic, can produce ionization, and should be considered a carcinogen. (Non-ionization radiation is the subject of chapter 10 in the book). Although perhaps recognized later than its chemical counterparts, ionizing radiation is now regarded as a carcinogen, and can act independently or synergistically with other carcinogens to produce neoplasia in living systems; due to its unique mechanisms of mutation and biological effect. It is intended that this chapter convince you of the carcinogenic nature of ionizing radiation, if you are not already. This chapter will first explain the physical interaction between the different forms of ionizing radiation and cells and sub-cellular components, as well as the factors which are more likely to produce an elevated risk of neoplasia. Next, the biological and molecular effects of radiation within living systems will be examined, followed by a presentation of the epidemiological evidence for radiation as a carcinogen in animals and humans. Some risk models for carcinogenesis following an exposure to ionizing radiation are included, as well as some strategies for protection against radiation-induced biological damage. Important new avenues of research and some of the controversial issues surrounding radiation carcinogenesis are brought forth. Finally, the significance of ionizing radiation carcinogenesis in the context of understanding and managing the difficult problem of human cancer etiology will be addressed.

Derived from text

Ionizing Radiation; Carcinogens; Radiation Effects; Biological Effects; Electromagnetic Radiation; Radiation Damage

Subject Term Index

Personal Author Index