Dr. William F. Mitchell

Contact Information

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Professional Objective

To advance numerical algorithms for scientific computation to fully utilize evolving computer architectures through basic and applied research and to develop mathematical software for the scientific computing community.

Education

Emphasis in numerical analysis, applied mathematics, and computer science.

University of Illinois at Urbana-Champaign, Computer Science, Ph.D., 1988

Purdue University, Computer Science, M.S., 1983

University of South Carolina, Mathematics, graduate studies, 1980

Clarkson University, Mathematics, M.S., 1978

Clarkson University, Mathematics, B.S., 1977

Employment

1993-present, Computer Scientist, Mathematical and Computational Sciences Division, National Institute of Standards and Technology. Plan and conduct research and development of numerical methods, mathematical software, and related tools, and consult and collaborate in their application to scientific problems. Primary field of research is numerical solution of elliptic partial differential equations, multigrid methods, adaptive methods, parallel computing, solution of Schroedinger equations, and development of Fortran 90 tools.

1988-1993, Senior Member Engineering Staff, Advanced Technology Laboratory, General Electric Corporation. Responsible for activities involving numerical algorithms and parallel processing, including implementations on CM-2 and iPSC/860. Also involved in sequential and parallel algorithms for combinatorial optimization, algorithm-based fault tolerance, signal sorting, data association and target tracking, and computer supported collaboration.

1977-1988, Graduate Assistant at each university attended. Teaching of undergraduate classes in mathematics and computer science. Research in the numerical solution of elliptic partial differential equations on nonrectangular domains. At Purdue, development of collocation software for ELLPACK, a software package for elliptic PDEs. At Illinois, development, analysis and coding of adaptive refinement and multigrid techniques for high order finite element solutions of partial differential equations.

Visiting Positions

June 1997, ICASE, NASA Langley Research Center, Hampton, VA

Publications in Refereed Journals

W.F. Mitchell, Review of "Understanding and Implementing the Finite Element Method" by Mark S. Gockenbach, *SIAM Review*, 49 (3), 2007, pp. 532–533.

W.F. Mitchell, A Refinement-tree Based Partitioning Method for Dynamic Load Balancing with Adaptively Refined Grids, *J. Par. Dist. Comput.*, 67 (4), 2007, pp. 417–429.

P. Naidon, E. Tiesinga, W.F. Mitchell and P.S. Julienne, Effective-range Description of a Bose Gas Under Strong One- or Two-Dimensional Confinement, *New Journal of Physics*, 9 (2007) 19.

W.F. Mitchell and E. Tiesinga, Adaptive Grid Refinement For a Model of Two Confined and Interacting Atoms, *Applied Numerical Mathematics*, **52**, No. 2-3 (2005) 235–250.

W.F. Mitchell, Hamiltonian Paths Through Two- and Three-Dimensional Grids, *NIST J. Res.*, **110**, No. 2, 127–136 (2005).

W.F. Mitchell, Parallel Adaptive Multilevel Methods with Full Domain Partitions, *Applied Numerical Analysis and Computational Mathematics*, **1**, No. 1, 36–48 (2004).

S.R. Coriell, G.B. McFadden, W.F. Mitchell, B.T. Murray, J.B. Andrews, Y. Arikawa, Effect of Flow due to Density Change on Eutectic Growth, *Journal of Crystal Growth* 224 (2001), pp. 821-846.

W.F. Mitchell, Review of "Programming the Finite Element Method, Third Edition" by I.M. Smith and D.V. Griffiths, *SIAM Review*, 41 (3), 1999, p. 620.

W.F. Mitchell, The Fortran 90 Bindings for OpenGL, *ACM Fortran Forum*, 18 (1), 1999, pp. 5–13.

W.F. Mitchell, The Refinement-Tree Partition for Parallel Solution of Partial Differential Equations, *NIST Journal of Research*, 103 (4), 1998, pp. 405–414.

W.F. Mitchell, A Parallel Multigrid Method Using the Full Domain Partition, *Electronic Transactions on Numerical Analysis*, **6**, 224–233 (1998).

W.F. Mitchell, The Full Domain Partition Approach to Distributing Adaptive Grids, *Applied Numerical Mathematics*, **26** (1-2), 265–275 (1998).

S.R. Coriell, W.F. Mitchell, B.T. Murray, J.B. Andrews and Y. Arikawa, Analysis of Monotectic Growth: Infinite Diffusion in the L_2 Phase, *Journal of Crystal Growth* 179 (1997), pp. 647–657.

W.F. Mitchell, StopWatch: A Module for Portable Measurement of Execution time, *Fortran Journal* 9 (1997).

W.F. Mitchell, Review of "PLTMG: A Software Package for Solving Elliptic Partial Differential Equations, User's Guide 7.0", *Mathematics of Computation* 64 (1995), pp. 1343–1345.

W.F. Mitchell, Optimal multilevel iterative methods for adaptive grids, *SIAM J. Sci. Statist. Comput.* 13 (1992), pp. 146–167.

W.F. Mitchell, Adaptive refinement for arbitrary finite element spaces with hierarchical bases, *J. Comp. Appl. Math.* 36 (1991), pp. 65–78.

W.F. Mitchell, A comparison of adaptive refinement techniques for elliptic problems. *ACM Trans. Math. Soft.* 15 (1989), pp. 326–347.

E.N. Houstis, W.F. Mitchell, and J.R. Rice, Collocation software for second-order elliptic partial differential equations. *ACM Trans. Math. Soft.* 11 (1985), pp. 379–412.

E.N. Houstis, W.F. Mitchell, and J.R. Rice, Algorithm 637 GENCOL:Collocation on general domains with bicubic Hermite polynomials, *ACM Trans. Math. Soft.* 11 (1985), pp. 413–415.

E.N. Houstis, W.F. Mitchell and J.R. Rice, Algorithm 638 INTCOL and HERMCOL: Collocation on rectangular domains with bicubic Hermite polynomials, *ACM Trans. Math. Soft.* 11 (1985), pp. 416–418.

E.N. Houstis, W.F. Mitchell and T.S. Papatheodorou, Performance evaluation of algorithms for mildly nonlinear elliptic problems. *Int. J. Num. Meth. Eng.* 19 (1983), pp. 665–709.

Publications in Conference Proceedings

W.F. Mitchell, The Design of a Parallel Adaptive Multi-Level Code in Fortran 90, *Proceedings of the 2002 International Conference on Computational Science*.

W.F. Mitchell, Adaptive Grid Refinement and Multigrid on Cluster Computers, *Proceedings of the 15th International Parallel and Distributed Processing Symposium*, IEEE Computer Society Press, 2001.

W.F. Mitchell, A Refinement-Tree Based Partitioning Method for Adaptively Refined Grids, *Proceedings of the Tenth SIAM Conference on Parallel Processing for Scientific Computing*, 2001.

W.F. Mitchell, A Comparison of Three Fast Repartition Methods for Adaptive Grids, *Proceedings of the Ninth SIAM Conference on Parallel Processing for Scientific Computing*, 1999.

W.F. Mitchell, The Full Domain Partition Approach to Parallel Adaptive Refinement, in *Grid Generation and Adaptive Algorithms*, *IMA Volumes in Mathematics and its Applications*, 113, Springer-Verlag, 1999, pp. 151–162.

W.F. Mitchell, The Full Domain Partition Approach for Parallel Multigrid on Adaptive Grids, *Proceedings of the* 8^{th} *SIAM Conference on Parallel Processing for Scientific Computing*, SIAM, Philadelphia, 1997.

W.F. Mitchell, Refinement Tree Based Partitioning for Adaptive Grids, *Proceedings of the* 7^{th} *SIAM Conference on Parallel Processing for Scientific Computing*, SIAM, 1995, pp. 587–592.

W.F. Mitchell, MGGHAT: Hierarchical Finite Element Multilevel Adaptive Solution of Elliptic Partial Differential Equations, *Proceedings of the* $14^t h$ *IMACS World Congress on Computational and Applied Mathematics*, 1994, pp. 356–359.

W.F. Mitchell, MGGHAT: Elliptic PDE Software with Adaptive Refinement, Multigrid and High Order Finite Elements, *Sixth Copper Mountain Conference on Multgrid Methods*, N.D. Melson, T.A. Manteuffel and S.F. McCormick, Eds., NASA, 1993, pp. 439–448.

D.K. Krecker and W.F. Mitchell, Parallel pulse correlation and geolocation, *Proceedings of the Fourth Symposium on the Frontiers of Massively Parallel Computation*, IEEE Computer Society Press, 1992, pp. 541–542.

W.F. Mitchell, Algorithm-based fault tolerance on the Connection Machine, *Advances in Computer Methods for Partial Differential Equations VII*, R. Vichnevetsky, D. Knight and G. Richter, Eds., IMACS, 1992, pp. 526–531.

W.F. Mitchell, A systolic array for Kalman filtering with algorithm based fault tolerance, *Advanced Signal Processing Algorithms, Architectures, and Implementations*, SPIE Vol. 1348, 1990, pp. 450–461.

W.F. Mitchell, Optimal multilevel iterative methods for adaptive grids, *Preliminary Proceedings of Copper Mountain Conference on Iterative Methods*, 1990.

W.F. Mitchell and J. D'Angelo, A nonsymmetric nonhermitian complex matrix, *Preliminary proceedings of Copper Mountain Conference on Iterative Methods*, (1990).

E.N. Houstis, W.F. Mitchell and T.S. Papatheodorou, A C^1-collocation method for mildly nonlinear elliptic equations on general 2-D domains, in *Advances in Computer Methods for Partial Differential Equations III*, R. Vichnevetsky and R.S. Stepleman, Eds., IMACS, 1979, 18–27.

Technical Reports

W.F. Mitchell, PHAML User's Guide, NISTIR 7374, 2006.

A. Fein, W.F. Mitchell, J. Sims, The Physics Laboratory Guide to The Central Scientific Computing Linux Cluster, 2006, http://www-i.nist.gov/cio/esd/services/sc/pccluster/doc/raritan-guide.pdf

K. Devine, B. Hendrickson, E. Boman, M. St. John, C. Vaughan and W.F. Mitchell, Zoltan: A Dynamic Load-Balancing Library for Parallel Applications, Developer's Guide, Sandia Technical Report SAND99-1376, 2000.

K. Devine, B. Hendrickson, E. Boman, M. St. John, C. Vaughan and W.F. Mitchell, Zoltan: A Dynamic Load-Balancing Library for Parallel Applications, User's Guide, Sandia Technical Report SAND99-1377, 2000.

W.F. Mitchell, A Fortran 90 Interface for OpenGL: Revised January 1998, NISTIR 6134, 1998.

W.F. Mitchell, A Fortran 90 Interface for OpenGL, NISTIR 5985, 1997.

W.F. Mitchell, StopWatch User's Guide Version 1.0, NISTIR 5971, 1997.

W.F. Mitchell, MGGHAT User's Guide Version 1.1, NISTIR 5948, 1997.

R.F. Boisvert, D.W. Lozier, M. McClain, B. Miller and W.F. Mitchell, Preliminary Design of a Taxonomy for Mathematical Software, NIST Working Note.

W.F. Mitchell, A fault-tolerant Kalman filter systolic array, General Electric Advanced Technology Laboratory technical report CMAT-90-TR-008, Moorestown, NJ, 1990.

W.F. Mitchell, An N(N+1) processor 4N+6M step Kalman filter systolic array, General Electric Advanced Technology Laboratory technical report CMAT-90-TR-007, Moorestown, NJ, 1990.

W.F. Mitchell and D.K. Krecker, Tracking multiple targets with ESM, General Electric Advanced Technology Laboratory technical report CMAT-90-TR-006, Moorestown, NJ, 1990.

W.F. Mitchell, Algorithm-based fault tolerance on the Connection Machine, General Electric Advanced Technology Laboratory technical report CMAT-89-TR-003, Moorestown, NJ, 1989.

M. Pagan, J. Van Zandt, W. Mitchell, D. Krecker, W. Lundgren, L. Armstrong, Parallel processor algorithms, General Electric Advanced Technology Laboratory technical report CMAT-89-TR-001, Moorestown, NJ, 1989.

J. Berman, S. Matlin, S. Brown, D. Krecker, G. Mebus and W. Mitchell, Parallel planning and scheduling, General Electric Technical Information Series, No. 88SDS025, 1988.

W.F. Mitchell, Unified multilevel adaptive finite element methods for elliptic problems, Ph.D. thesis, Technical report UIUCDCS-R-88-1436, Department of Computer Science, University of Illinois, Urbana, IL, 1988.

W.F. Mitchell, A comparison of adaptive refinement techniques for elliptic problems, Technical report UIUCDCS-R-87-1375, Department of Computer Science, University of Illinois, Urbana, IL, 1987.

Other Publications

W.F. Mitchell, Portable Graphics from Fortran with OpenGL, Compaq Fortran Newsletter, Issue VII, December 2000.

J.E. Devaney, R. Lipman, M. Lo, W.F. Mitchell, M. Edwards, C.W. Clark, The Parallel Applications Development Environment (PADE) User's Manual, distributed with the PADE software package and available in hypertext form at http://physics.nist.gov/ResOpp/hpcc/pade_man/pade_man.html, May 1995.

W.F. Mitchell, MGGHAT User's Guide Version 1.1, distributed with the MGGHAT software package and available in hypertext form at http://gams.nist.gov/reports/mgghat/userguide/userguide.html, June 1994.

Invited Talks

W.F. Mitchell, A Parallel Adaptive Multilevel Method for Elliptic Boundary Value and Eigenvalue Problems, Rensselaer Polytechnic Institute, Troy, NY, February 4, 2004.

W.F. Mitchell, A Preview of Fortran 2000, NIST MCSD Colloquium, Boulder, March 27, 2003.

W.F. Mitchell, A Preview of Fortran 2000, NIST MCSD Colloquium, March 18, 2003.

W.F. Mitchell, Parallel Adaptive Multigrid Software for Elliptic PDEs and Eigenvalue Problems, NIST MCSD Colloquium, March 19, 2002.

W.F. Mitchell, Grid Partitioning with the Full Domain Partition, University of Kentucky, Lexington, KY, October 17, 2000.

W.F. Mitchell, Parallelization of Adaptive Multilevel Methods, University of Freiburg, Freiburg, Germany, June 7–9, 1999.

W.F. Mitchell, Full Domain Partitions to Reduce Communication in Parallel PDE Solvers, University of Maryland, College Park, MD, March 11, 1999.

W.F. Mitchell, Full Domain Partitions to Reduce Communication in Parallel PDE Solvers, Sandia National Laboratories, Albuquerque,NM, September 17, 1998.

W.F. Mitchell, Full Domain Partitions to Reduce Communication in Parallel PDE Solvers, Rensselaer Polytechnic Institute, Troy, NY, February 13, 1998.

W.F. Mitchell, Full Domain Partitions to Reduce Communication in Parallel PDE Solvers, North Carolina State University, Raleigh, NC, September 26, 1997.

W.F. Mitchell, Overview of a Parallel Hierarchical Adaptive Multilevel Method, ICASE, Hampton, VA, June 27, 1997.

W.F. Mitchell, Overview of a Parallel Hierarchical Adaptive Multilevel Method, University of Augsburg, Augsburg, Germany, February 24, 1997.

W.F. Mitchell, Overview of a Parallel Hierarchical Adaptive Multilevel Method, National Institute of Standards and Technology, Gaithersburg, MD, February 11, 1997.

W.F. Mitchell, An Introduction to Fortran 90, National Institute of Standards and Technology, Gaithersburg, MD, September 19, 1995.

W.F. Mitchell, The Hierarchical Basis Approach to Multilevel Adaptive Methods and Partitioning Adaptive Grids, University of Maryland, College Park, MD, October 13, 1994.

W.F. Mitchell, The Hierarchical Basis Approach to Multilevel Adaptive Methods and Partitioning Adaptive Grids, University of Colorado, Boulder, CO, September 27, 1994.

W.F. Mitchell, The Hierarchical Basis Approach to Multilevel Adaptive Methods and Partitioning Adaptive Grids, National Institute of Standards and Technology, Boulder, CO, September 23, 1994.

W.F. Mitchell, The Hierarchical Basis Approach to Multilevel Adaptive Methods and Partitioning Adaptive Grids, National Institute of Standards and Technology, Gaithersburg, MD, September 20, 1994.

W.F. Mitchell, Using the Hierarchical Basis for Adaptive Refinement and Multigrid with High Order Finite Elements, University of Missouri-Rolla, Rolla, MO, April 26, 1993.

W.F. Mitchell, Using the Hierarchical Basis for Adaptive Refinement and Multigrid with High Order Finite Elements, National Institute of Standards and Technology, Gaithersburg, MD, February 19, 1993.

W.F. Mitchell, Parallel Processing for Finite Difference and Finite Element Models, National Center for Atmospheric Research, Boulder, CO, August 13, 1992.

W.F. Mitchell, Adaptive Refinement, Multigrid, and Parallel Computation for Elliptic Problems, Rutgers University, Camden, NJ, March 11, 1992.

W.F. Mitchell, Unified Multilevel Adaptive Finite Element Methods for Elliptic Problems, General Electric Advanced Technology Laboratories, Moorestown, NJ, 1988.

W.F. Mitchell, Unified Multilevel Adaptive Finite Element Methods for Elliptic Problems, Digital Equipment Corporation, Marlboro, MA, 1988.

W.F. Mitchell, Unified Multilevel Adaptive Finite Element Methods for Elliptic Problems, Cray Research, Minneapolis, MN, 1988.

W.F. Mitchell, Unified Multilevel Adaptive Finite Element Methods for Elliptic Problems, North Carolina State University, Raleigh, NC, 1988.

Plenary Conference Talks

W.F. Mitchell, Strategies for hp-Adaptive Refinement, *Sixth International Conference of Numerical Analysis and Applied Mathematics*, September 2008.

W.F. Mitchell, Adaptive Grid Refinement For a Model of Two Confined and Interacting Atoms, *Adaptive Methods for Partial Differential Equations and Large-Scale Computation*, October 2003.

W.F. Mitchell, Parallel Adaptive Multilevel Methods with Full Domain Partitions, *First International Conference on Numerical Analysis & Computational Mathematics*, May 2003.

Invited Conference Talks

W.F. Mitchell, Error Estimators for the hp Version of the Finite Element Method with Newest Node Bisection of Triangles, *8th U.S. National Congress on Computational Mechanics*, July 2005.

W.F. Mitchell and E. Tiesinga, A Parallel Multigrid Method Applied to Schroedinger's Equation, *The Eleventh Confererence On Parallel Processing for Scientific Computing*, February 2004.

W.F. Mitchell and E. Tiesinga, On Preconditioners for Interior Eigenvalues of Schroedinger's Equation, *2003 International Conference On Preconditioning Techniques For Large Sparse Matrix Problems In Industrial Applications*, October 2003.

W.F. Mitchell, The Design of a Parallel Adaptive Multi-Level Code in Fortran 90, *International Conference on Computational Science ICCS2002, Workshop on PDE Software*, April 2002.

W.F. Mitchell, Refinement Tree Based Dynamic Load Balancing for Adaptive Grids, *First SIAM Conference on Computational Science and Engineering*, September, 2000.

W.F. Mitchell, Parallel Adaptive Finite Elements with the Full Domain Partition, *Fifth US National Congress on Computational Mechanics*, August 1999.

W.F. Mitchell, The Full Domain Partition Method, *Scalable Linear Solvers Workshop '99*, June 1999.

W.F. Mitchell, Coarse Grain Parallel Adaptive Multilevel Methods, *Fast Solvers for Partial Differential Equations*, June 1999.

W.F. Mitchell, Approaches to Parallel Multigrid with the Full Domain Partition, *Ninth SIAM Conference on Parallel Processing for Scientific Computing*, March 1999.

W.F. Mitchell, Full Domain Partitions to Reduce Communication in Parallel PDE Solvers, *Symposium on Adaptive Methods for Partial Differential Equations*, June 1998.

W.F. Mitchell, The Full Domain Partition Approach to Parallel Adaptive Refinement, *IMA Workshop on Grid Generation and Adaptive Algorithms*, April 1997.

W.F. Mitchell, Overview of a Parallel Hierarchical Adaptive Multilevel Method, *Adaptive Methods for Partial Differential Equations*, February 1997.

W.F. Mitchell, Full Domain Partitions of Adaptive Grids, *Workshop on Parallel Unstructured Mesh Computations*, September 1996.

W.F. Mitchell, MGGHAT: Hierarchical Finite Element Multilevel Adaptive Solution of Elliptic Partial Differential Equations, 14^{th} *IMACS World Congress on Computational and Applied Mathematics*, July 1994.

W.F. Mitchell, Algorithm-based fault tolerance on the Connection Machine, 7^{th} *IMACS International Conference on Computer Methods for Partial Differential Equations*, June 1992.

W.F. Mitchell, A systolic array for Kalman filtering with algorithm based fault tolerance, SPIE's 1990 International Symposium on Optical and Optoelectronic Applied Science and Engineering, July 1990.

Contributed Conference Talks

W.F. Mitchell, Application of a Parallel Adaptive Finite Element Code to Confined Interacting Atoms, *SIAM Annual Meeting*, July 2008.

W.F. Mitchell, A Parallel Multigrid Preconditioner for High-order and *hp*-Adaptive Finite Elements, *Thirteenth SIAM Conference on Parallel Processing for Scientific Computing*, March 2008.

W.F. Mitchell and E. Tiesinga, An h-p Adaptive Strategy With Limited p, *SIAM Conference on Computational Science and Engineering*, February 2007.

W.F. Mitchell, PHAML: A Parallel hp-Adaptive Multigrid Program for 2D Elliptic Problems, *Fifth International Conference on Scientific Computing and Applications*, May 2006.

W.F. Mitchell, The Addition of hp-Adaptivity to a Parallel Adaptive Finite Element Program, *Twelth SIAM Conference on Parallel Processing for Scientific Computing*, February 2006.

W.F. Mitchell, Multigrid Methods for the hp Version of the Finite Element Method, *8th U.S. National Congress on Computational Mechanics*, July 2005.

W.F. Mitchell, A Parallel Multigrid Method Applied to Schroedinger's Equation, *Eleventh SIAM Conference on Parallel Processing for Scientific Computing*, February 2004.

W.F. Mitchell and E. Tiesinga, On Preconditioners for Interior Eigenvalues of Schroedinger's Equation, *2003 International Conference On Preconditioning Techniques For Large Sparse Matrix Problems In Industrial Applications*, October 2003.

W.F. Mitchell, PHAML: A Parallel Adaptive Multilevel Program for Elliptic PDEs, *Eleventh Copper Mountain Conference on Multigrid Methods*, March, 2003.

W.F. Mitchell, Parallel Adaptive Grid Refinement in PHAML, *IMACS Workshop on Adaptive Methods for Partial Differential Equations*, August 2002.

W.F. Mitchell and E. Tiesinga, Computing Interior Eigenvalues of a Schroedinger Equation, *Seventh Copper Mountain Conference on Iterative Methods*, March 2002.

W.F. Mitchell, Load Balancing with a Refinement-Tree Based Partition, *Sixth U.S. National Conference on Computational Mechanics*, August, 2001.

W.F. Mitchell, A Refinement-Tree Based Partitioning Method for Adaptively Refined Grids, *Tenth SIAM Conference on Parallel Processing for Scientific Computing*, March, 2001.

W.F. Mitchell, Approaches to Parallel Multigrid with the Full Domain Partition, *Ninth Copper Mountain Conference on Multigrid Methods*, April 1999.

W.F. Mitchell, A Comparison of Three Fast Repartition Methods for Adaptive Grids, *Ninth SIAM Conference on Parallel Processing for Scientific Computing*, March 1999.

W.F. Mitchell, Parallel Multigrid and Domain Decomposition with Overlap on Each Level, *Tenth International Conference on Domain Decomposition Methods*, August 1997.

W.F. Mitchell, A Parallel Adaptive Multilevel Method Using the Full Domain Partition, 8^{th} *Copper Mountain Conference on Multigrid Methods*, April 1997.

W.F. Mitchell, The Full Domain Partition Approach for Parallel Multigrid on Adaptive Grids, 8^{th} *SIAM Conference on Parallel Processing for Scientific Computing*, March 1997.

W.F. Mitchell, A Proposed Fortran 90 Binding for OpenGL, *OpenGL Architecture Review Board meeting*, December 1996.

W.F. Mitchell, The Full Domain Partition Approach to Distributing Adaptive Grids, *Grid Adaptation in Computational PDEs: Theory and Applications*, July 1996.

W.F. Mitchell, Characteristics and Components of PDE Libraries, *ARPA/NSF Scalable Scientific Software Libraries and Problem Solving Environments Workshop*, September 1995.

W.F. Mitchell, An Interleaved Adaptive Refinement Multigrid Algorithm, *Copper Mountain Conference on Multigrid Methods*, April 1995.

W.F. Mitchell, Refinement Tree Based Partitioning for Adaptive Grids, 7^{th} *SIAM Conference on Parallel Processing for Scientific Computing*, February 1995.

W.F. Mitchell, MGGHAT: Elliptic PDE Software with Adaptive Refinement, Multigrid and High Order Finite Elements, *Sixth Copper Mountain Conference on Multigrid Methods*, April 1993.

W.F. Mitchell, Optimal multilevel iterative methods for adaptive grids, *Copper Mountain Conference on Iterative Methods*, April 1990.

W.F. Mitchell and J. D'Angelo, A Nonsymmetric Nonhermitian Complex Matrix, *Copper Mountain Conference on Iterative Methods*, April 1990.

W.F. Mitchell, Algorithm-Based Fault Tolerance on the Connection Machine, *Sixth Parallel Circus*, October 1989.

W.F. Mitchell, Distributed and centralized parallel algorithms for selective scheduling problems, *Fourth Parallel Circus*, December 1988.

W.F. Mitchell, An optimal blending of adaptive refinement and multigrid solution, *Virginia Tech-ICAM Conference on Numerical Solutions of Partial Differential Equations*, September 1988.

E.N. Houstis, W.F. Mitchell and T.S. Papatheodorou, A C^1-collocation method for mildly nonlinear elliptic equations on general 2-D domains, 3^{rd} *IMACS International Conference on Computer Methods for Partial Differential Equations*, June 1979.

W.F. Mitchell, Collocation for Nonlinear Problems, *Numerial Analysis Conference*, 1977.

Talks Coauthored

K. Devine, E. Boman, B. Hendrickson, W. Mitchell and C. Vaughan, Applications of Dynamic Load Balancing, Sixth U.S. National Congress on Computatinal Mechanics, Dearborn, MI, August 2001 (presented by K. Devine).

W. Mitchell and E. Tiesinga, Multigrid Modeling of Two Confined and Interacting Atoms, Tenth Copper Mountain Conference on Multigrid Methods, Copper Mountain, CO, April 2001 (presented by E. Tiesinga).

Y. Arikawa, J.B. Andrews, S.R. Coriell, W.F. Mitchell and B.T. Murray, Numerical Simulation of Directional Solidification of Hypermonotectic Alloys with Residual Gravity, The Minerals, Metals & Materials Society 1996 Annual Meeting, Anaheim, California, February 1996 (presented by Y. Arikawa).

J.T. Fong, W.F. Mitchell, Z. Wang, D.E. Dietrich, B. Bernstein, Demonstration of a Multimedia Conferencing Tool for Piping Designers Using a Collaborative Object-Oriented Toolkit Named SCOOT, ASME/JSME Pressure Vessels and Piping Conference, Honolulu, Hawaii, July 1995 (presented by J.T. Fong)

J. Devaney, R. Lipman, M. Lo, W. Mitchell, M. Edwards, C. Clark, PADE – The Parallel Applications Development Environment, 1995 PVM Users' Group Meeting, Pittsburgh, PA, May 1995 (presented by C. Clark).

Y. Arikawa, J.B. Andrews, W.F. Mitchell, and S.R. Coriell, Modeling and Numerical Simulation of Direcitonal Solidification of Hypermonotectic Alloys, The Minerals, Metals & Materials Society 1995 Annual Meeting, Las Vegas, Nevada, February 1995 (presented by Y. Arikawa).

Y. Arikawa, J.B. Andrews, S.R. Coriell, and W.F. Mitchell, Modeling and Numerical Simulation of Processes at a Hypermonotectic Solidification Front, *Proceedings of the International Conference on Experimental Methods for Microgravity Material Science Research*, R.A. Schiffman, ed., San Francisco, CA, March 1994 (presented by Y. Arikawa).

L.S. Gardiner, B.R. Frederick, T.A. Chmielewski, P. Bilazarian, W.F. Mitchell and D.E. Graff, High resolution and efficient oceanographic and acoustic modeling of propagation through mesoscale oceanic features, 121st meeting of the Acoustical Society of America, April 1991 (presented by P. Bilazarian).

J. D'Angelo, M.A. Palmo and W.F. Mitchell, Matrix solution techniques for finite element frequency domain analysis of RF scattering problems, Progress in Electromagnetic Research, 1991 (presented by J. D'Angelo).

E.N. Houstis, W.F. Mitchell and T.S. Papatheodorou, Performance Evaluation of Numerical Methods for Mildly Nonlinear Elliptic Equations, TICOM, March 1979 (presented by E.N. Houstis).

Posters

E. Tiesinga, W.F. Mitchell, Adaptive Grid Modeling of Two Interacting Atoms, *34th Meeting of the Division of Atomic, Molecular and Optical Physics*, May 20–24, 2003.

W.F. Mitchell, A Fast Partitioning Algorithm for Adaptive Grids, *Supercomputing '94*, November 14–18, 1994.

W.F. Mitchell, A Fast Partitioning Algorithm for Adaptive Grids, *Workshop on Domain-Based Parallelism and Problem Solving Decomposition Methods in Computational Science and Engineering*, April 25–26, 1994.

D.K. Krecker and W.F. Mitchell, Parallel pulse correlation and geolocation, *Fourth Symposium on the Frontiers of Massively Parallel Computation*, October 19-21, 1992.

Conferences

Sixth International Converence of Numerical Analysis and Applied Mmathematics, Kos, Greece, September 16–20, 2008.

SIAM Annual Meeting, San Diego, CA, July 7-11, 2008.

The Thirteenth SIAM Conference On Parallel Processing for Scientific Computing, Atlanta, Georgia, March 12-14, 2008.

SIAM Conference on Computational Science and Engineering, Costa Mesa, California, February 19-23, 2007.

Fifth International Conference on Scientific Computing and Applications, Banff, Alberta, Canada, May 18-21, 2006.

The Twelth SIAM Confererence On Parallel Processing for Scientific Computing, San Francisco, California, February 22-24, 2006.

8th U.S. National Congress on Computational Mechanics, Austin, Texas, July 25-27, 2005.

The Eleventh SIAM Confererence On Parallel Processing for Scientific Computing, San Francisco, California, February 25-27, 2004.

2003 International Conference On Preconditioning Techniques For Large Sparse Matrix Problems In Industrial Applications, Napa, California, October 27-29, 2003.

Adaptive Methods for Partial Differential Equations and Large-Scale Computation, Troy, NY, October 11-12, 2003.

First International Conference on Numerical Analysis & Computational Mathematics, Cambridge, UK, May 23-26, 2003.

Eleventh Copper Mountain Conference on Multigrid Methods, Copper Mountain, CO, March 30-April 4, 2003.

Sixth IMACS International Symposium on Iterative Methods in Scientific Computing, Denver, CO, March 27-30, 2003.

IMACS Workshop on Adaptive Methods for Partial Differential Equations, Toronto, Canada, August 6-9, 2002.

International Conference on Computational Science ICCS2002, Workshop on PDE Software, Amsterdam, The Netherlands, April 21-24, 2002.

Seventh Copper Mountain Conference on Iterative Methods, Copper Mountain, CO, March 25-29, 2002.

Sixth U.S. National Congress on Computational Mechanics, Dearborn, MI, August 1-3, 2001.

Tenth SIAM Conference on Parallel Processing for Scientific Computing, Portsmouth, VA, March 12-14, 2001.

Workshop on Computational Methods for Few-Body Dynamical Systems, Gaithersburg, MD, November 15–17, 2000.

First SIAM Conference on Computational Science and Engineering, Washington, DC, September 21–24, 2000.

J3 Fortran Standards Comittee Meeting, Las Vegas, NV, March 1–3, 2000.

Workshop on Graph Partitioning and Applications: Current and Future Directions, Minneapolis, MN, October 14–15, 1999.

Fifth US National Congress on Computational Mechanics, Boulder, CO, August 4–6, 1999.

International Symposium on Computational Science in honor of John Rice, West Lafayette, IN, May 21-22, 1999.

Ninth Copper Mountain Conference on Multigrid Methods, Copper Mountain, CO, April 11–16, 1999.

Ninth SIAM Conference on Parallel Processing for Scientific Computing, San Antonio, TX, March 22–24, 1999.

Tenth International Conference on Domain Decomposition Methods, Boulder, CO, August 10–14, 1997.

8^{th} Copper Mountain Conference on Multigrid Methods, Copper Mountain, CO, April 6–11, 1997.

8^{th} SIAM Conference on Parallel Processing for Scientific Computing, Minneapolis, MN, March 14–17, 1997.

OpenGL ARB meeting, San Diego, CA, December 9, 1996.

Grid Adaptation in Computational PDEs: Theory and Applications, Edinburgh, Scotland, July 1–5, 1996.

Copper Mountain Conference on Multigrid Methods, Copper Mountain, CO, April 2–7, 1995.

7^{th} SIAM Conference on Parallel Processing for Scientific Computing, San Francisco, CA, February 15–17, 1995.

Supercomputing '94, Washington, DC, November 14–18, 1994.

ICASE/LaRC Workshop on Adaptive-Grid Methods, Hampton, VA, November 7–9, 1994.

Workshop on Quantum Computing and Communication, Gaithersburg, MD, August 18–19, 1994.

14^{th} IMACS World Congress on Computational and Applied Mathematics, Atlanta, GA, July 11–15, 1994.

Workshop on Domain-Based Parallelism and Problem Solving Decomposition Methods in Computational Science and Engineering, Minneapolis, MN, April 25–26, 1994.

Supercomputing '93, Portland, OR, November 15–19, 1993.

Sixth Copper Mountain Conference on Multigrid Methods, Copper Mountain, CO, April 4–9, 1993.

7^{th} IMACS International Conference on Computer Methods for Partial Differential Equations, New Brunswick, NJ, June 22–24, 1992.

868^{th} Meeting of the American Mathematical Society, Numerical Linear Algebra Session, Philadelphia, PA, October 12–13, 1991.

Fifth Conference on Domain Decomposition Methods for Partial Differential Equations, Norfolk, VA, May 6–8, 1991.

Fifth Copper Mountain Conference on Multigrid Methods, Copper Mountain, CO, March 31 – April 5, 1991.

Unstructured Scientific Computation on Scalable Multiprocessors, Kill Devil Hills, NC, October 29–31, 1990.

SPIE's 1990 International Symposium on Optical and Optoelectronic Applied Science and Engineering, San Diego, CA, July 8–13, 1990.

Copper Mountain Conference on Iterative Methods, Copper Mountain, CO, April 1–5, 1990.

Sixth Parallel Circus, New York, NY, October 27–28, 1989.

Parallel Computing for GE Applications, Schenectady, NY, September 27-29, 1989.

Fourth Parallel Circus, New Brunswick, NJ, December 2–3, 1988.

Virginia Tech-ICAM Conference on Numerical Solutions of Partial Differential Equations, Blacksburg, VA, September 24–27, 1988.

Scientific Applications of the Connection Machine, Moffett Field, CA, September 12–14, 1988.

Conference in honor of Jim Douglas, Chicago, IL, 1987.

3^{rd} IMACS International Conference on Computer Methods for Partial Differential Equations, Bethlehem, PA, 1979.

SIAM conference, Knoxville, TN, 1979.

Numerical Analysis Conference, Syracuse, NY, 1977.

Invitational Workshops

A posteriori Error Estimation and Adaptive Approaches in the Finite Element Method, MSRI, Berkeley, CA, April 3–14, 2000.

Scalable Solvers Workshop '99, Livermore, CA, June 23–25, 1999.

Fast Solvers for Partial Differential Equations, Oberwolfach, Germany, May 30–June 4, 1999.

Symposium on Adaptive Methods for Partial Differential Equations, Salt Lake City, Utah, June 22–24, 1998.

IMA Workshop on Grid Generation and Adaptive Algorithms, Minneapolis, MN, April 28–May 2, 1997.

Adaptive Methods for Partial Differential Equations, Oberwolfach, Germany, February 16–22, 1997.

Workshop on Parallel Unstructured Mesh Computations, Argonne, IL, September 9–11, 1996.

ARPA/NSF Scalable Scientific Software Libraries and Problem Solving Environments Workshop, West Lafayette, IN, September 25–27, 1995.

Software

PHAML, a Fortran 90 program for the solution of elliptic boundary value and eigenvalue problems, using finite elements, hp-adaptive refinement, and multigrid, on distributed memory parallel computers. In addition to its use by many people for running physical simulations, it has been used in classes on parallel computing at Purdue University, and as an application code in research on load balancing for heterogeneous clusters at Rensselaer Polytechnic Institute and Williams College. Available at http://math.nist.gov/phaml.
Version 0.9.0 April 2002
Version 0.9.1 June 2002
Version 0.9.2 October 2002
Version 0.9.3 January 2003
Version 0.9.4 February 2003
Version 0.9.5 March 2003
Version 0.9.6 April 2003
Version 0.9.7 May 2003
Version 0.9.8 June 2003
Version 0.9.9 June 2003
Version 0.9.10 July 2003
Version 0.9.11 August 2003
Version 0.9.12 November 2003
Version 0.9.13 November 2003
Version 0.9.14 March 2004
Version 0.9.15 March 2004
Version 0.9.16 June 2004
Version 0.9.17 September 2004
Version 0.9.18 September 2004
Version 0.9.19 November 2004
Version 0.9.20 January 2005
Version 0.9.21 January 2005
Version 0.9.22 February 2006
Version 0.9.23 April 2006
Version 0.9.24 July 2006
Version 0.9.25 September 2006
Version 0.9.26 January 2007
Version 1.0.0 May 2007
Version 1.1.0 July 2007
Version 1.2.0 October 2007
Version 1.3.0 January 2008
Version 1.3.1 January 2008
Version 1.4.0 April 2008

Zoltan, suite of parallel algorithms for dynamically partitioning problems over sets of processors. With E. Boman, K. Devine, B. Hendrickson, M. St. John, and C. Vaughan. Contributed the REFTREE method and the Fortran 90 interface. Available at http://www.cs.sandia.gov/Zoltan.
Version 1.23 February 2001
Version 1.3 March 2002
Version 1.4 June 2002
Version 1.41 August 2002
Version 1.5 May 2003
Version 1.51 June 2003
Version 1.52 December 2003
Version 1.53 June 2004
Version 1.54 July 2004
Version 1.55 October 2004
Version 1.56 May 2005
Version 2.0 March 2006
Version 2.1 October 2006
Version 3.0 May 2007

f90gl, a Fortran 90 interface for the graphics libraries of OpenGL, Mesa and GLUT. Available at http://math.nist.gov/f90gl.
Version 1.0.0 October 1996
Version 1.1.0 May 1998
Version 1.1.1 June 1998
Version 1.1.2 November 1998
Version 1.1.3 March 1999
Version 1.1.4 April 1999
Version 1.2.0 June 1999
Version 1.2.1 December 1999
Version 1.2.2 February 2000
Version 1.2.3 August 2000
Version 1.2.4 December 2000
Version 1.2.5 November 2002
Version 1.2.6 January 2003
Version 1.2.7 February 2003
Version 1.2.8 January 2004
Version 1.2.9 February 2004
Version 1.2.10 February 2005
Version 1.2.11 November 2005
Version 1.2.12 September 2006

StopWatch, a Fortran 90 module for portable measurement of execution time of program segments. Available at http://math.nist.gov/stopwatch.
Version 0.8 June 1995
Version 1.0 January 1997

PADE, the Parallel Applications Development Environment. With J.E. Devaney, R. Lipman, M. Lo, M. Edwards, J. Turner, and C.W. Clark. Available from math.nist.gov.
Version 1.2 May 1995
Version 1.4 November 1995

MGGHAT, a portable FORTRAN software package for the solution of 2D linear elliptic partial differential equations, using adaptive refinement, multigrid and high order finite elements. Available at *netlib* and *mgnet*.
Version 1.0 March 1993
Version 1.1 June 1994

GENCOL, a FORTRAN 77 subroutine for the solution of general second order elliptic partial differential equations in two dimensions on general domains using collocation with hermite bicubic elements. Contributed to ELLPACK and Collected Algorithms of the ACM (TOMS). 1982

Standards

2000, Presented several recommendations on C interoperability to the Fortran Standards committee, many of which became part of the Fortran 2003 standard.

1998, Developed the Fortran 90 bindings for OpenGL, which became part of the OpenGL standard.

Teaching

1995-2000, Fortran 90 for FORTRAN 77 Programers, NIST Gaithersburg and Boulder.

1980, Fortran, Purdue University.

1979, Calculus for Business Majors, University of South Carolina.

1978, Calculus, Clarkson University.

Patents

W.F. Mitchell, Regular and Fault-Tolerant Kalman Filter Systolic Arrays, U.S. Patent 5,323,335, June 21, 1994, rights owned by Lockheed Martin Corporation.

Awards

2008, ITL Outstanding Journal Paper Award

1996, DOC Bronze Medal for work on PADE

1978, membership in Pi Mu Epsilon, honorary mathematics society

Acknowledgements

James S. Sims, William L. George, Tere Griffin, John G. Hagedorn, Howard K. Hung, John T. Kelso, Marc Olano, Adele P. Peskin, Steven G. Sattereld and Judith Devaney Terrill, Accelerating Scientic Discovery through Computation and Visualization III. Tight-binding Wave Functions for Quantum Dots, *Journal of Research of NIST*, **113**, No. 3, (2008), 131–142.

G.W. Stewart, MATRAN 95 A Fortran 95 Matrix Wrapper, University of Maryland, Department of Computer Science Technical Report 4522 (2003).

J.F. Marchiando, J.R. Lowney and J.J. Kopanski, Models for Interpreting Scanning Capacitance Microscope Measurements, *Scanning Microscopy International*, **12**, No. 1, (1998) 205–224.

J.F. Marchiando, On Using Collocation in Three Dimensions and Solving a Model Semiconductor Problem, *Journal of Research of NIST*, **100**, No. 6 (1995) 661–676.

F.Y. Hunt and R.D. McMichael, Analytical Expressions for Barkhausen Jump Size Distributions, *IEEE Transactions on Magnetics*, **30**, No. 6 (1994) 4356–4358.

Professional Activities

Member of:

Society of Industrial and Applied Mathematics

Activity Group on Linear Algebra
Activity Group on Supercomputing

Association for Computing Machinery

Special Interest Group on Numerical Mathematics

United States Association for Computational Mechanics

International Association for Computational Mechanics

Referee/Reviewer for:

ACM Transactions on Mathematical Software

Applied Numerical Mathematics

Cambridge Press

Computers & Structures

Computers in Engineering

Computing and Visualization in Science

Department of Energy

Engineering with Computers

High Performance Computing, Networking and Communication Systems

IEEE Computational Science & Engineering

IEEE Computing in Science & Engineering

IEEE Transactions on Parallel and Distributed Computing

International Journal of Computational Science and Engineering

ISCOPE 2001

Journal of Computational and Applied Mathematics

Journal of Computational Physics

Mathematics of Computation

National Science Foundation

NIST ATP

NIST WERB

Numerical Algorithms

Numerical Linear Algebra with Applications

Numerische Mathematik

Parallel Computing

SIAM Journal on Scientific Computing

Supercomputing 96

7th SIAM Conference on Parallel Processing for Scientific Computing

9th International Parallel Processing Symposium

10th International Conference on Domain Decomposition Methods

41st Magnetism and Magnetic Materials Conference

Editor, International Journal of Applied Mathematics and Computational Science, 2006-present.

Editor, Journal of Numerical Analysis, Industrial and Applied Mathematics, 2006-present.

Editor, Applied Numerical Analysis and Computational Mathematics, 2001-2005.

Member Scientific Committee, International Conference of Numerical Analysis and Applied Mathematics (ICNAAM 2008), Kos, Greece, September 16-20, 2008.

Co-organized (with Ronald Boisvert, NIST) a minisymposium on PDE Software in Applications, SIAM Annual Meeting, San Diego, CA, July 7–11, 2008.

Member Program Committee, International Conference on High Performance Computing, Networking and Communication Systems (HPCNCS-08), Orlando, FL, July 7-10, 2008.

Member Scientific Committee, International Conference of Numerical Analysis and Applied Mathematics (ICNAAM 2007), Corfu, Greece, September 16-20, 2007.

Member Program Committee, International Conference on High Performance Computing, Networking and Communication Systems (HPCNCS-07), Orlando, FL, July 9-12, 2007.

Member Scientific Committee, International Conference of Numerical Analysis and Applied Mathematics (ICNAAM 2006), Hersonnisos, Crete, Greece, September 15-19, 2006.

Chaired the session on Finite Element Methods at the Twelth SIAM Conference on Parallel Processing for Scientific Computing, San Francisco, CA, February 22-24, 2006.

Member Scientific Committee, First International Conference on Numerical Analysis & Computational Mathematics, Cambridge, UK, May 23-26, 2003.

Chaired the session on Discretizations at the Sixth IMACS International Symposium on Iterative Methods in Scientific Computing, Denver, CO, March 27-30, 2003.

Co-organized (with Prof. Joseph Flaherty, RPI) a minisymposium on Dynamic Load Balancing for Adaptive Computations, Sixth U.S. National Congress on Computational Mechanics, Dearborn, MI, August 1-3, 2001.

Chaired the session on Advances in Grid and Mesh Technology, Tenth SIAM Conference on Parallel Processing for Scientific Computing, Portsmouth, VA, March 12-14, 2001.