

AMY L. BAUER

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EDUCATION

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| 2007 | Ph.D. in Mathematics, University of Michigan, Ann Arbor. |
| 2003 | M.B.A. in Finance, University of Illinois at Chicago. |
| 2001 | M.S. in Mathematics, University of Illinois at Chicago. |
| 1994 | B.S. in Finance, University of Illinois at Chicago. |

HONORS AND AWARDS

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| 2008 | Association for Women in Mathematics Travel Grant Recipient. |
| 2004-2002 | NSF VIGRE Fellowship (5 year), University of Michigan, Mathematics Dept. |
| 2003 | Beta Gamma Sigma National Honor Society. |
| 2001 | NSF VIGRE Fellowship (5 year), University of Illinois, Mathematics Dept. |
| 2000 | Mathematics Departmental Teaching Assistant Award. |
| 1996 | Price Waterhouse Special Teams Award for Outstanding Achievement. |
| 1995 | Golden Key National Honor Society. |
| 1994 | Finance Club Scholarship Recipient. |

PEER-REVIEWED PUBLICATIONS

1. A.L. Bauer, T.L. Jackson, Y. Jiang, T. Rohlf. Stochastic Network Model of Receptor Cross-Talk Explains Pro- and Anti-Angiogenic Control. arXiv:0802.3926. Submitted, 2008.
2. A.L. Bauer. Brush Border Effect Emerges from Multi-Scale Model of Tumor Angiogenesis. In preparation, 2008.
3. A.L. Bauer, T.L. Jackson, Y. Jiang. Topography of Extracellular Matrix Mediates Vascular Morphogenesis and Migration Speeds During Angiogenesis. In revision for *PLoS Computational Biology*, 2008.
4. A.L. Bauer, M.J. Cawkwell, T.D. Sewell. Comparative Structure Analysis of Hot-Spot Formation During Material Deformation. In preparation, 2008.
5. F. Mu, A.L. Bauer, W.S. Hlavacek. Use of Carbon-Fate Maps to Determine Metabolic Fluxes from ^{13}C -labeling dynamics. Book chapter for *Handbook of Chemoinformatics Algorithms*. Submitted, 2008.

6. A.L. Bauer. ANGIO: An Open Source Multi-Scale Simulation Tool for Investigating Angiogenesis. In preparation, 2008.
7. A.L. Bauer, I.B. Hogue, S. Marino, D.E. Kirschner. The Effects of HIV-1 Infection on Latent Tuberculosis. *Mathematical Modelling of Natural Phenomena*, **3**(7):229-266, 2008.
8. A.L. Bauer, C. Beauchemin, A.S. Perelson. Agent-Based Modeling of Host-Pathogen Systems: The Successes and Challenges. *Information Sciences*. DOI: 10.1016/j.ins.2008.11.012, 2008.
9. A.L. Bauer, R. Loubere, B. Wendroff. On Stability of Staggered Schemes. *SIAM Journal on Numerical Analysis*, **46**(2):996-1011, 2008.
10. A.L. Bauer, T.L. Jackson, Y. Jiang. A Cell-Based Model Exhibiting Branching and Anastomosis During Tumor-Induced Angiogenesis. *Biophysical Journal*, **92**:3105-3121, 2007.
11. A.L. Bauer, D.E. Burton, E. J. Caramana, R. Loubere, M.J. Shashkov, P.P. Whalen. The Internal Consistency, Stability and Accuracy of the Discrete, Compatible Formulation of Lagrangian Hydrodynamics. *Journal of Computational Physics*, **218**(2):572-593, 2006.
12. J.G. Younger, T.L. Jackson, A.L. Bauer, et al., Dynamics of Intrapulmonary Bacterial Growth in a Murine Model of Repeated Microaspiration. *American Journal of Respiratory Cell and Molecular Biology*, **33**(5):476-482, 2005.

INVITED TALKS

1. NAVBO Vascular Biology Conference, New Orleans, LA., Apr 18-22, 2009.
2. The National Academies Keck Futures Initiative Complex Systems Conference, Arnold & Mabel Beckman Center, Irvine, CA., Nov 12-15, 2008.
3. Workshop on Evolution in Health and Disease, Gulbenkian Institute, Lisbon, Portugal, Sept 22-26, 2008.
4. Society for Mathematical Biology Conference - Multiscale Modeling of Biological Systems, Jul 30-Aug 2, 2008.
5. From Molecule to Morphology: A Multi-Scale Cell-Based Model of Angiogenesis. University of Kansas Medical Center, Dept. of Anatomy and Cell Biology, May 8, 2008.
6. A Multi-Scale Cell-Based Model of Tumor-Induced Angiogenesis. University of California-Merced, Applied Mathematics Seminar, Apr 28, 2008.
7. Cellular Model of Tumor-Induced Angiogenesis. Immunetrics, Pittsburgh, PA., Mar 8, 2007.
8. Cellular Model of Tumor-Induced Angiogenesis. Johns Hopkins University, Department of Biomedical Engineering, Mar 6, 2007.
9. A Cell-Based Model Exhibiting Branching and Anastomosis During Tumor-Induced Angiogenesis. University of Utah, Department of Mathematics, Mathematical Biology Seminar, Feb 7, 2007.

CONTRIBUTED TALKS AND POSTERS

1. Second Annual q-bio Conference on Cellular Information Processing, Santa Fe, NM., Aug 6-9, 2008.
2. Understanding Hot-Spot Physics and Chemistry in Energetic Materials Initiation. Gordon Research Conference on Energetic Materials, Tilton, NH. Poster Jun 2008.

3. The Effects of HIV-1 Infection on Latent Tuberculosis. Biosecurity Science Workshop, Los Alamos National Laboratory, Los Alamos, NM. Poster Dec 2007.
4. Cellular Model of Tumor-Induced Angiogenesis. 51st Biophysical Society Annual Meeting - Baltimore, MD. Poster Mar 2007.
5. Branching Out: A Cell-Based Model of Tumor-Induced Angiogenesis. MBI Workshop on Blood Flow in the Microcirculation: Function, Regulation, and Adaptation. Mathematical Biosciences Institute, Columbus, OH. Poster Jan 2007.
6. Branching Out: A Cell-Based Model of Tumor-Induced Angiogenesis. DIMACS Workshop on Computational Tumor Modeling, Rutgers University, NJ. Poster Aug 2006.
7. A Cellular Model of Tumor-Induced Angiogenesis. Los Alamos National Laboratory, Mathematical Modeling and Analysis Group, Seminar Aug 17, 2006.
8. Cellular Potts Model of the Initiation of Tumor Angiogenesis. University of Michigan, Department of Microbiology, Kirschner Laboratory, Seminar Apr 6, 2006.
9. The Role of Extracellular Matrix Structure and Composition in Tumor-Induced Angiogenesis. University of Michigan, Dept. of Mathematics, Mathematical Biology Seminar Jan 12, 2006.
10. A Multiscale Model of Cell-Matrix Dynamics in Angiogenesis. University of Michigan, Department of Mathematics, Mathematical Biology Seminar Sept 8, 2005.
11. Cell Motility and Capillary Network Formation. Los Alamos National Laboratory, Mathematical Modeling and Analysis Group, Seminar Aug 16, 2005.
12. A.L. Bauer, Virulence of *Klebsiella Pneumoniae* Predicted by Nonlinear Biodistributive Mathematical Model. 27th Annual Conference on Shock - Halifax, Nova Scotia. Poster June 2004.
13. A.L. Bauer, Regulation and Stability of Host-Parasite Population Interactions. University of Michigan, Department of Mathematics, Applied Math Seminar Feb 14, 2003.

APPOINTMENTS

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| 2007-present | T-14 Explosives and Organic Materials, Postdoctoral Research Associate Theoretical Division, Los Alamos National Laboratory. |
| 2005-2007 | T-7 Mathematical Modeling and Analysis, Ph.D. Dissertation Research Theoretical Division, Los Alamos National Laboratory. |
| 2004 Sum | T-7 Mathematical Modeling and Analysis, Internship Theoretical Division, Los Alamos National Laboratory. |
| 2002 Sum | Graduate Instructor, Mathematical Biology National Science Foundation Research Experience for Undergraduates, University of Illinois at Chicago. |
| 2000-2001 | Emerging Scholar's Program Lecturer, Teaching Assistant Pre-Calculus, Calculus, University of Illinois at Chicago. |
| 1995-1999 | Tax Consultant, PriceWaterhouseCoopers LLP. |

TEACHING/MENTORING EXPERIENCE

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| 2008-present | Co-advisor for Madjid Soltani, Graduate Student Engineering Department, University of Waterloo, Canada. |
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| 2006 Winter | Graduate Instructor, Pre-Calculus, Calculus I, II, III Mathematics Lab, University of Michigan. |
| 2002 Summer | Graduate Instructor, Mathematical Biology National Science Foundation Research Experience for Undergraduates. |
| 2001-2002 | Emerging Scholar's Program Lecturer, Pre-Calculus University of Illinois at Chicago. |
| 2000-2001 | Teaching Assistant, Calculus I, University of Illinois at Chicago. |

SERVICE

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| Present | Referee for Journal of Theoretical Biology, Bulletin of Mathematical Biology, Pure and Applied Mathematics Quarterly, and Birth Defects Research: Embryo Today: Reviews. |
| 2007 | Los Alamos Postdoc Association, Los Alamos National Laboratory (LANL). |
| 2007 | Design and Maintenance of T-14 and T-17 Websites, LANL. |
| 2007 | Organized Inter-Departmental Workshop on Practical Computing in Python, Univ. of MI, Mathematical Biology Research Group. |
| 2006 | Student Resolution Panelist, Univ. of MI, Office of Student Conflict Resolution. |
| 2003 | Developed VIGRE LaTeX Seminar, Univ. of MI, Department of Mathematics. |
| 2002 | Recruiting Luncheon, Univ. of MI, Department of Mathematics. |
| 2001-2002 | Graduate Student Government Representative, University of Illinois at Chicago, Department of Mathematics. |
| 2001 | Department of Mathematics Webmaster, University of Illinois at Chicago. |

PROFESSIONAL ASSOCIATIONS

- Biophysical Society
- Society for Mathematical Biology
- American Mathematical Society
- Society for Industrial and Applied Mathematics
- Association for Women in Mathematics
- National Postdoc Association
- National Ski Patrol

RESEARCH INTERESTS

My research focuses on the development of nonlinear multi-scale mathematical and physics based theoretical models of biological systems and numerical simulations based on these models. One major area of my research is the development of a novel multi-scale cell-based model of tumor-induced angiogenesis (blood vessel growth). This model is the first to simulate emergent vessel branching, anastomosis, and the brush border effect. These complex macroscale structures arise as a result of microscale behavior without any rules prescribing their formation. Ongoing research interests include tumor-induced angiogenesis, blood flow, infectious diseases, and self-organizing systems.

Recently, I have been investigating how local structural heterogeneities (crystal defects) in energetic materials give rise to hot spot formation. This theoretical research involves understanding and simulating shock-induced plastic deformation in energetic materials at both the atomistic (molecular dynamics) and continuum scales (EOS), and developing homogenization techniques based on statistical descriptions to integrate the atomistic scale physics into meso-scale models.

More generally, I am interested in utilizing my applied mathematics and numerical simulation training in solving high impact applied science problems.