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Employment

- **Post Doctoral Research Associate**, Purdue University, August 2008–present
  Mentor: Prof. Robert D. Skeel

Education

- **Ph.D.** Mathematics, Purdue University, 2008
  Advisor: Prof. Fabio A. Milner
- **M.S.** Computational Mathematics, Nankai University, China, 2002
  Advisor: Prof. Che Sun
- **B.S.** Computational Mathematics, Nankai University, China, 1999

Current Research Interests

- **Computational Biology**: Coarse-grained molecular dynamics modeling of protein, calculating free energy differences and transition pathways for biomolecular systems
- **Mathematical Biology**: Modeling and simulation of human infectious diseases, parasitic diseases, and tumor growth
- **Numerical Analysis**: Numerical solutions of partial differential equations

Publications

- Papers in Refereed Journals – available at www.cs.purdue.edu/homes/rzhao
  - **R. Zhao**, J. Shen, and R. D. Skeel. *Maximum flux transition paths of conformational change.* J. Chem. Theory Comput. 6:2411–2423, 2010.
  - F. A. Milner and **R. Zhao**. *A new mathematical model of syphilis.* Math. Model. Nat. Phenom. 5:96–108, 2010.
  - **R. Zhao** and F. A. Milner. *A mathematical model of Schistosoma mansoni in Biomphalaria glabrata with control strategies.* Bull. Math. Biol. 70:1886–1905, 2008.
  - F. A. Milner and **R. Zhao**. *A deterministic model of schistosomiasis with spatial structure.* Math. Biosc. and Engin. 5:505–522, 2008.
  - F. A. Milner and **R. Zhao**. *S-I-R model with directed spatial diffusion.* Math. Pop. Stud. 15:160–181, 2008.
- Technical Report
  - S. Lyu, B. Cook, T. Kazakova, P. Madrid, J. Neal, M. Pauletti, and **R. Zhao**. *Cell-foreign particle interaction.* IMA Preprint Series #2133–3, September 2006.

- Papers in Preparation
  - **R. Zhao**, H. Huang, C. B. Post, and R. D. Skeel. *A variational formulation for the maximum flux transition path.*
  - H. Huang, **R. Zhao**, R. D. Skeel, and C. B. Post. *Role of the alpha–C helix in Src activation: A computational study.*
- Theses
  - *Some Mathematical Models and Scientific Computations in Epidemiology and Immunology.* Ph.D. dissertation.
  - *Locally-One-Dimensional Finite-Difference Streamline-Diffusion Method for Nonlinear Convection-Diffusion Equations.* M.S. thesis.

Fellowships and Grants

- Fellowships
  - VIGRE Fellowship, Purdue University, Summer 2007, Summer 2008
  - Graduate Research Assistantship, Purdue University, 2005–2006
  - Purdue Research Foundation Grant, Purdue University, Summer 2005
  - Outstanding Graduate Student Award, Nankai University, China, 1999–2002
- Tavel Grants
  - Symposium on Biomathematics and Ecology Education and Research, 2010
  - "Hands-On" Workshop on Computational Biophysics using NAMD and VMD, 2010
  - Frontiers in Mathematical Biology: NSF–NIH PIs Meeting, 2010
  - Frontiers in Applied and Computational Mathematics, 2009
  - Rare Events in High-Dimensional Systems, 2009
  - Workshop for Young Researchers in Mathematical Biology, 2008
  - Southeastern-Atlantic Regional Conference on Differential Equations, 2007
  - Annual meeting of the Society for Mathematical Biology, 2007
  - IMA Pi Summer Program for Graduate Students: Applicable Algebraic Geometry, 2007
  - Mathematical Modeling in Industry X–A Workshop for Graduate Students, 2006

Presentations and Meetings

- Invited Talks
  - *An epidemic S-I-R model with directed spatial diffusion.* AMS Fall Central Section Meeting, Notre Dame, November 5–7, 2010.
  - *Transition pathways of conformational change in biomolecules and their relative probabilities.* Department of Mathematics and Statistics, University of Missouri–Kansas City, January 25, 2010.
  - *Is the resurgence of syphilis a backward bifurcation?* Joint Mathematics Meetings, San Francisco, California, January 13–16, 2010.

- *Why and how to compute transition paths?* Center for Computational & Applied Mathematics seminar, Purdue University, January 23, 2009.
- *SIR model with directed spatial diffusion.* Department of Mathematics, Western Kentucky University, April 15, 2008.
- *S-I-R model with directed spatial diffusion.* Computational Science & Engineering seminar, Purdue University, March 19, 2008.
- *Mathematical models in epidemiology, ecology and immunology.* Department of Mathematics & Computer Science, Valdosta State University, February 27, 2008.
- *Mathematical modeling of schistosomiasis.* Center for Computational & Applied Mathematics seminar, Purdue University, October 12, 2007.

• Contributed Talks

- *A mathematical model of schistosomiasis.* Symposium on Biomathematics and Ecology Education and Research, Illinois State University, September 4–5, 2010.
- *Maximum flux transition paths and their relative probabilities.* Algorithms in Macromolecular Modeling Conference, The University of Texas at Austin, November 11–15, 2009.
- *Transition paths of conformational changes in biomolecules.* Postdoctoral Research Symposium, Argonne National Laboratory, September 10, 2009.
- *A new mathematical model of syphilis.* AMS Spring Central Meeting, Indiana University, April 5–6, 2008.
- *A new mathematical model of schistosomiasis.* Joint Mathematics Meetings, San Diego, California, January 6–9, 2008.
- *Backward bifurcation in drug-resistant SIR models.* Southeastern-Atlantic Regional Conference on Differential Equations, Murray State University, October 19–20, 2007.
- *An S-I-R model of epidemics with directed spatial diffusion.* Annual Meeting of the Society for Mathematical Biology, San Jose, California, July 31–August 3, 2007.
- *A mathematical model of schistosomiasis with spatial structure.* Spring Indiana MAA Section Meeting, University of Indianapolis, March 23–24, 2007.

• Poster Presentations

- *Transition pathways for biomolecular systems: Mathematics and computation.* Frontiers in Mathematical Biology: NSF–NIH PIs Meeting, University of Maryland, College Park, April 26–27, 2010.
- *Maximum flux transition paths.* Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, June 1–2, 2009.
- *Maximum flux transition path.* Molecular Simulations: Algorithms, Analysis, and Applications, The Institute for Mathematics and its Applications, University of Minnesota, May 18–22, 2009.
- *Maximum probability transition paths.* Rare Events in High-Dimensional Systems, Institute For Pure and Applied Mathematics, University of California, Los Angeles, February 23–27, 2009.

- *A new view of CDC's Plan of Elimination of Syphilis.* Workshop for Young Researchers in Mathematical Biology, Mathematical Biosciences Institute, Ohio State University, September 2–4, 2008.

- Meetings Attended
  - Conference on High Performance Scientific Computing: Architectures, Algorithms, and Applications, Purdue University, October 11–12, 2010.
  - "Hands-On" Workshop on Computational Biophysics using NAMD and VMD, National Resource for Biomedical Supercomputing, Pittsburgh, May 10–14, 2010.
  - Purdue Mathematical Biology 2008 Conference: Differential Equations and Applications in Ecology and Epidemiology, Purdue University, December 8–10, 2008.
  - Purdue Quantitative Physiology 2008 Conference: Dynamical systems in physiological modeling, Purdue University, October 11–13, 2008.
  - IMA Pi Summer Program for Graduate Students: Applicable Algebraic Geometry, Texas A&M University, July 23–August 10, 2007.
  - The 3rd Symposium on Analysis & PDEs, Purdue University, May 27–30, 2007.
  - The Fall 2006 Society for Natural Philosophy Meeting (Conference), Purdue University, November 11–12, 2006.
  - Mathematical Modeling in Industry X–A Workshop for Graduate Students, The Institute for Mathematics and its Applications, University of Minnesota, August 9–18, 2006.
  - National Graduate Summer School in Mathematics, University of Science and Technology of China, China, July 11–August 4, 2001.

Teaching Experiences

- **Course Instructor**
  Duties include conducting lectures three times per section per week, holding office hours, writing and grading exams and quizzes, and assigning grades.
  - MA224 (2 sections)– Introduction to Analysis II, Fall 2007
  - MA223 (2 sections)– Introduction to Analysis I, Fall 2006, Spring 2007
  - MA153 (2 sections)– Algebra and Trigonometry I, Fall 2004

- **Recitation Instructor**
  Duties include conducting recitation lectures once (MA261) or twice (MA161) per section per week, writing and grading quizzes.
  - MA161 (1 section)– Plane Analytic Geometry and Calculus I, Spring 2004
  - MA261 (2 sections)– Multivariate Calculus, Fall 2003

Programming Skills

- Programming Languages: Fortran77/90, C/C++, OpenGL
- Scripting Languages: Python, Mathematica, Matlab
- Molecular Simulators: CHARMM, NAMD, VMD

Services and Memberships

- Reviewer for The Second International Conference on the Applications of Digital Information and Web Technologies, 2009
- Reviewer for Computational Structural Bioinformatics Workshop in IEEE BIBM, 2009
- Member of College of Science Graduate Student Council at Purdue University, 2007–2008
- Member of Society of Mathematical Biology, 2006–present
- Member of Society for Industrial and Applied Mathematics, 2007–present
- Member of American Mathematics Society, 2002–2008
- Member of Mathematical Association of America, 2007–2008

References

Prof. **Fabio A. Milner**
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Texas Tech University
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