

Karin M. Leiderman

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EDUCATION **University of Utah**, Salt Lake City, Utah, USA

Ph.D., Mathematics, Expected May 2010

Advisor: Aaron L. Fogelson

Research: Mathematical Modeling of Thrombosis

University of New Mexico, Albuquerque, New Mexico, USA

M.S., Mathematics, May 2004

Graduated with distinction

Certificate in Computational Science and Engineering

University of New Mexico, Albuquerque, New Mexico, USA

B.S., Mathematics, December 2001

Minor in Biology

RESEARCH INTERESTS My research interests focus on Mathematical Biology, specifically biological fluid dynamics and biomechanics. Other interests include porous media flow, numerical methods for solving partial differential equations, regularization methods, and scientific computing.

PUBLICATIONS Leiderman, K. and A.L. Fogelson. *Grow with the Flow: A Spatial-Temporal Model of Platelet Deposition and Blood Coagulation Under Flow*. *Math. Med. Biol.* (submitted).

Leiderman, K., L.A. Miller, and A.L. Fogelson. *The Effect of Spatial Inhomogeneities on Flow Through the Endothelial Surface Layer*. *J. Theor. Biol.* 2008; May 21;252(2):313-25.

Leiderman, K. and S.L. Steinberg. *High-resolution models of motion of macromolecules in cell membranes*. *Math. Comput. Simulat.* 2008; April 4;77(4):383-399.

Zhang J., K. Leiderman, J.R. Pfeiffer, B.S. Wilson, J.M. Oliver, and S.L. Steinberg. *Characterizing the topography of membrane receptors and signaling molecules from spatial patterns obtained using nanometer-scale electron-dense probes and electron microscopy*. *Micron.* 2006; 37(1):14-34.

Oliver J.M., J.R. Pfeiffer, Z. Surviladze, S.L. Steinberg, K. Leiderman, M.L. Sanders, C. Wofsy, J. Zhang, H. Fan, N. Andrews, S. Bunge, T.J. Boyle, P. Kotula, and B.S. Wilson. *Membrane receptor mapping: the membrane topography of FcεRI signaling*. *Subcell. Biochem.* 2004; 37:3-34. Review.

Wilson B.S., S.L. Steinberg, K. Leiderman, J.R. Pfeiffer, Z. Surviladze, J. Zhang, L.E. Samelson, L.H. Yang, P.G. Kotula, and J.M. Oliver. *Markers for detergent-resistant lipid rafts occupy distinct and dynamic domains in native membranes*. *Mol. Biol. Cell.* 2004 Jun; 15(6):2580-92.

RESEARCH
EXPERIENCE

Ph.D. Student, University of Utah August 2005 - Present
Research topics included a model of flow through the endothelial surface layer, a spatial-temporal model of platelet deposition and blood coagulation under flow, and developing new numerical methods for solving equations of porous media flow.
Advisor: Aaron L. Fogelson

Graduate Summer School in Mathematical Biology Participant Summer 2005
Institute of Advanced Study/ Park City Mathematics Institute
Participated in project on actin flux regulation in stereocilia.
Joint work with Alexandra Jilkine, Atilla Toth, Leah Keshet, and Nicholas Hill.

PanAmerican Workshop in Applied and Computational Mathematics Participant Summer 2004
Universidad Nacional Autnoma de Honduras
Took four week-long short courses: Algorithms for Nonlinear Optimization, Least Squares Data Fitting with Applications, Applications of Parallel Computers, and An Introduction to Engineering Scientific Computing.

Research Fellow, University of New Mexico January 2003 - May 2004
Conducted research at the Center for Spatio-temporal Modeling of Cell Signalling Networks. Redesigned algorithms for spatial statistics analysis and image processing. Studied lateral diffusion in cell membranes and helped design a Monte Carlo simulation written in MATLAB and C++ to calculate diffusion coefficients for Brownian motion and anomalous diffusion.

Southern California Bioinformatics Summer Institute Intern Summer 2003
Took part in the NSF/NIH-funded summer program hosted by California State University at Los Angeles. Worked at ViaLogy, Inc. designing high-throughput data analysis programs as well as statistically analyzing microarray data.

Program for Women in Mathematics Participant Summer 2003
Institute for Advanced Study, Princeton, New Jersey
Program focus: Mathematical Biology.

TEACHING
EXPERIENCE

Teaching Fellow, University of Utah August 2008 - June 2009
Awarded NSF Research and Training Group (RTG) fellowship for assisting upper-level undergraduate Mathematical Biology courses taught by Berton Earnshaw and Aaron Fogelson. Helped students with homework and semester projects. Held office hours and graded homeworks.

Course Instructor, University of Utah August 2006 - May 2007
Full teaching responsibilities for Quantitative Analysis and Accelerated Engineering Calculus courses. Duties included writing and delivering lectures, writing and grading exams, and advising students during regular office hours.

Undergraduate Mathematics Tutor, University of Utah August 2006 - May 2007
Worked in the Mathematics Tutoring Center once a week to assist undergraduate students in all areas of Mathematics.

Teaching Workshop Participant, University of Utah Summer 2006
Participant in two-week teaching workshop hosted by the Center for Teaching and Learning Excellence at the University of Utah.

Graduate Student Mentor, University of Utah August 2005 - May 2006
Teaching assistant and mentor for the Mathematical Biology Journal Club. Assisted first-year graduate students with reading, understanding and presenting classic Mathematical Biology research papers.

Teaching Assistant Park City Mathematics Institute Summer 2005
Teaching assistant for the a Mathematical Biology Summer School course on cell and tissue physiology instructed by Alex Mogilner.

Course Instructor, University of New Mexico August - December 2002
Full teaching responsibilities for Pre-Calculus course. Duties included writing and delivering lectures, writing and grading exams, and advising students during regular office hours.

HONORS, AWARDS AND FELLOWSHIPS **Research Fellowship** August 2008 - August 2009
NSF Research Training Group (RTG) Fellowship

Student Travel Award August 2008
SIAM Life Sciences Meeting

Best Student Oral Presentation Award January 2007
Society for Integrative and Comparative Biology Annual Meeting - Biomechanics Division
Presentation: *Endothelial Mechanotransduction: Let's Sugarcoat It!*

Student Project Award July 2005
IAS/PCMI Graduate Summer School award for most original work
Joint work with Alexandra Jilkine, Atilla Toth, Leah Keshet, and Nicholas Hill
Project: *A Simple Model of Actin Flux Regulation in Stereocilia*

Research Fellowship August 2004 - August 2006
NSF-IGERT Fellowship for Cross-Disciplinary Research Training in Mathematical Biology

Research Fellowship January 2003 - May 2004
University of New Mexico Health Sciences Center - NIH(NIGMS)

CONFERENCES/
PRESENTATIONS **APS Division of Fluid Dynamics Annual Meeting**, Minneapolis, MN November 2009
Presentation: *A Computational Model of Platelet Deposition and Coagulation Under Flow*

MBI Workshop on Computational Challenges in Integrative Biological Modeling
Columbus, OH October 2009
Poster: *A Computational Model of Platelet Deposition and Coagulation Under Flow*

APS Division of Fluid Dynamics Annual Meeting, San Antonio, TX November 2008
Presentation: *Grow with the Flow: A Dynamic Tale of Blood Clot Formation*

SIAM Life Sciences Meeting, Montreal, Canada August 2008
Minisymposium co-organizer: *Swimming, Flying, Pumping and Clotting*
Presentation: *Grow with the Flow: A Dynamic Tale of Blood Clot Formation*

Gordon Research Conference (Theoretical Biology & Biomathematics)
Barga, Italy June 2008
Poster: *Grow with the Flow: A Dynamic Tale of Blood Clot Formation*

Society for Integrative and Comparative Biology January 2008
Annual Meeting, San Antonio, TX
Poster: *The Effect of Spatial Inhomogeneities on Flow Through the Endothelial Surface Layer*

Utah Mathematical Biology IGERT Student Workshop, Salt Lake City, UT July 2007
Workshop Host: Charles S. Peskin
Workshop Theme: Modeling and Simulation in the Life Sciences
Workshop Organizer and Lecturer

2007 IGERT Project Meeting, Arlington, VA May 2007
Invited Poster: *Mathematical and Physical Modeling of the Endothelial Glycocalyx*

SIAM Dynamical Systems Meeting, Snowbird, UT May 2007
Poster: *Mathematical and Physical Modeling of the Endothelial Glycocalyx*

MBI Workshop on Blood Flow in the Microcirculation, Columbus, OH January 2007
Presentation: *Mathematical and Physical Modeling of the Endothelial Glycocalyx*

Society for Integrative and Comparative Biology January 2007
Annual Meeting, Phoenix, AZ
Presentation: *Endothelial Mechanotransduction: Let's sugarcoat it!*

Joint SIAM/SMB Meeting on the Life Sciences, Raleigh, NC August 2006
Invited Minisymposium Presentation:
The Endothelial Glycocalyx: Flow, Permeability and Stress

2nd New Mexico Workshop on Computational Cell Biology January 2004
Santa Fe, NM
Poster: *Simulation of Anomalous Diffusion to Approximate Fluorescence Recovery Data*

2nd International Symposium on Computational Cell Biology March 2003
Lenox, MA
Poster: *Topographical Analysis of the IgE Receptor Signaling Pathway of Mast Cells*

PROFESSIONAL
MEMBERSHIPS

American Mathematical Society (AMS)
American Physical Society-Division of Fluid Dynamics (APS-DFD)
Association for Women in Mathematics (AWM)
Society of Comparative and Integrative Biology (SICB)
Society for Industrial and Applied Mathematics (SIAM)