

Becca Thomases

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EDUCATION

University of California, Santa Barbara. Ph.D. Mathematics: *Global Existence of 3D Nonlinear Incompressible Elastodynamics as a Limit of Slightly Compressible Materials*, June 2003.

Thesis advisor: Thomas Sideris.

University of California, Santa Barbara. M.A. Applied Mathematics, December 1999.

Vassar College. B.A. Mathematics, with honors, May 1997.

PROFESSIONAL EXPERIENCE

Associate Professor. July 2012 – present.

Mathematics Department, University of California, Davis.

Visiting Associate Professor. July 2017 - January 2018.

School of Engineering and Applied Sciences, Harvard University.

Assistant Professor. July 2007 – June 2012.

Mathematics Department, University of California, Davis.

Assistant Professor. September 2006 – June 2007.

Courant Institute of Mathematical Sciences, New York University.

Courant Instructor / Assistant Professor. September 2003 – August 2006.

Courant Institute of Mathematical Sciences, New York University.

GRANTS, FELLOWSHIPS, AND AWARDS

NSF Research Grant: FRG: Collaborative Research: Computational Methods for Complex Fluids: Adaptivity, Fluid-Structure Interaction, and Applications in Biology, DMS 1664679/1664645, 2017-2020. (co-Principal Investigator)

Provost's Fellowship for Innovation of Teaching Award: with T. Lewis, and S. Walcott, 2015-2016.

Travel Award: Association for Women in Mathematics, 2014.

Hellman Fellowship: University of California, Davis, 2010-2011.

Research/Travel Grant: Long-term visitor for the 2009-2010 Annual Program on Complex Fluids and Complex Flows, Institute for Mathematics and its Applications (IMA), University of Minnesota. February - June 2010.

NSF Research Grant: Viscoelastic Fluid Flow, DMS-0600668/0757813, 2006-2009. (Principal Investigator)

PUBLICATIONS

“Flagellar swimming in viscoelastic fluids: role of fluid elastic stress revealed by simulations based on experimental data”, (with C. Li, B. Qin, A. Gopinath, P. Arratia, and R.D. Guy) *Journal of The Royal Society Interface*, 14.135: 20170289, 2017

“The role of body flexibility in stroke enhancements for finite-length undulatory swimmers in viscoelastic fluids”, (with R.D. Guy) *Journal of Fluid Mechanics*, 825, pp. 109-132, 2017

“Immersed Boundary Smooth Extension (IBSE): A high-order method for solving incompressible flows in arbitrary smooth domains”, (with D.B. Stein, and R.D. Guy) *Journal of Computational Physics*, 335, 155-178, 2017

- “Equilibrium circulation and stress distribution in viscoelastic creeping flow”, (with J. A. Biello) *J. Non-Newtonian Fluid Mech.*, 229, pp. 101-111, 2016.
- “Immersed boundary smooth extension: A high-order method for solving PDE on arbitrary smooth domains using Fourier spectral methods,” (with D.B. Stein, and R.D. Guy) *Journal of Computational Physics*, 304, 252 - 274, 2016
- “Computational challenges for simulating strongly elastic flows in biology”, (with R.D. Guy) In *Complex Fluids in Biological Systems*. 359-397 2015.
- “Mechanisms of elastic enhancement and hindrance for finite length undulatory swimmers in viscoelastic fluids” (with R.D. Guy) *Physical Review Letters*, 113, 098102 2014.
- “An Analysis of the Effect of Stress Diffusion on the Dynamics of Creeping Viscoelastic Flow” *J. Non-Newtonian Fluid Mech.* 166, 1221-1228, 2011.
- “A Stokesian Viscoelastic Flow: Transition to Oscillations and Mixing” (with M. Shelley and J.-L. Thiffeault) *Phys. D.* 240 1602-1614, 2011.
- “Symmetric Factorization of the Conformation Tensor in Viscoelastic Fluid Models” (with N. Balci, M. Renardy, and C. Doering) *J. Non-Newtonian Fluid Mech.* (2011) 166, pp. 546-553.
- “Transition to Mixing and Oscillations in a Stokesian Viscoelastic Flow” (with M. Shelley) *Physical Review Letters* (2009) 103, 094501.
- “Emergence of Singular Structures in Oldroyd-B Fluids” (with M. Shelley) *Phys. Fluids* 19 (2007), no. 10.
- “Global Existence for 3D Incompressible Isotropic Elastodynamics.” (with T. Sideris) *Comm. Pure Appl. Math.* 60 (2007) no. 12, 1707 – 1730.
- “Elastic waves in exterior domains, Part II: Global existence with a null structure.” (with J. Metcalfe) *Int. Math. Res. Not.* (2007) rnm034-43.
- “Local Energy Decay For Solutions of Multi-Dimensional Isotropic Symmetric Hyperbolic Systems” (with T. Sideris) *J. Hyperbolic Differ. Equ.* (2006), no. 4, 673-690.
- “A Decay Theorem For Some Symmetric Hyperbolic Systems” (with C. Morawetz) *J. Hyperbolic Differ. Equ.* (2006), no. 3, 475–480.
- “Global Existence For 3D Incompressible Isotropic Elastodynamics Via the Incompressible Limit” (with T. Sideris) *Comm. Pure Appl. Math.* 58 (2005), no. 6, 750 – 788.
- “Long Time Behavior of Solutions to the 3D Compressible Euler Equations with Damping” (with T. Sideris and D. Wang), *Comm. PDE.* 28 (2003), no. 3-4, 795–816.

INVITED TALKS

- “Modeling Complex Fluids and Gels for Biological Applications” Conference, University of Utah, May 2017.
- Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Portland, OR, November 2016.
- SIAM Annual Meeting, Boston, MA, July, 2016.
- SIAM Life Sciences Conference, Boston, MA, July 2016.
- Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Boston, MA, November 2015.
- Annual Meeting of the Division of Fluid Dynamics, American Physical Society, San Francisco, CA November 2014.
- SIAM Life Sciences Conference, Charlotte, NC, August, 2014.
- SIAM Annual Meeting, Chicago, IL, July, 2014.
- AWM Symposium, Santa Clara University, Santa Clara, CA, March 2013.
- “The dynamics of elastic bio-structures in complex fluids,” Courant Institute of Mathematical Sciences Workshop, New York, NY, February, 2012.
- Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Baltimore, MD November 2011.

SIAM Conference on Analysis of Partial Differential Equations, San Diego, CA, November, 2011.

The Society of Rheology 83rd Annual Meeting, Session on Non-Newtonian Flows and Stability, Cleveland, October, 2011.

Applied Mathematics Perspectives 2011, ICIAM Satellite Meetings, Vancouver, British Columbia, Canada, July 2011

Annual Meeting of the Division of Fluid Dynamics, American Physical Society, Long Beach, CA, November 2010.

Annual Technical Meeting of the Society of Engineering Sciences, Ames, IA, October 2010.

“Flow instabilities and turbulence in viscoelastic fluids”, Lorentz Center, Leiden, The Netherlands, July 2010.

Frontiers in Applied and Computational Mathematics 2010, NJIT, Newark, NJ, May 2010.

Institute for Mathematics and its Applications, Workshop on “Transport and Mixing in complex and turbulent flows”, Minneapolis, MN, April 2010.

SIAM Conference on Dynamical Systems, Snowbird, UT, May 2009.

Annual Meeting of the Division of Fluid Dynamics, American Physical Society, November 2008.

Singular Phenomena in Nonlinear Optics, Hydrodynamics, and Plasmas, Banff International Research Station, Banff, Canada, October 2008.

OXMOS Workshop on Elastic Stability, University of Oxford, Oxford, England, October 2008.

SIAM Conference on Analysis of Partial Differential Equations, Phoenix, AZ, December 2007.

MSRI Summer Microprogram on Nonlinear Partial Differential Equations, Berkeley, CA, July - August 2007.

JAMI Conference “Nonlinear dispersive equations,” Baltimore, MD, March 2007.

Annual Meeting of the Division of Fluid Dynamics, American Physical Society, November 2006.

Interfacial Dynamics in Complex Fluids, Banff International Research Station, Banff, Canada, May 2006.

Workshop in Mathematical Physics: Trends and Perspectives, Stevens Institute of Technology, April 2006.

Eighth New Mexico Analysis Seminar, NMSU, Las Cruces, June 2005.

Joint Meetings, AMS-SIAM Special Session on Analysis and Applications in Nonlinear Partial Differential Equations, January 2005.

AMS Eastern Section Meeting, Special Session on Partial Differential Equations and Applications, November 2004.

Joint program of Morningside Mathematics Center and Institute of Mathematics (Chinese Academy of Sciences), Kinetic Theory and Related Topics, 8 hour Lecture Series, Aug 8-16, 2004.

SEMINAR / COLLOQUIUM TALKS

Tufts University, Condensed Matter Seminar, December 2017.

University of Wisconsin, Applied and Computational Math Seminar, November 2017.

Worcester Polytechnic Institute, Mathematics Colloquium, September 2017.

University of California, Santa Barbara, Mathematics Colloquium, March 2016.

University of Utah, Applied Mathematics Seminar, March 2015.

University of Nevada, Reno, Mechanical Engineering Seminar, September 2014.

Tufts University, Mechanical Engineering Seminar, September 2014.

Stanford University, Chemical Engineering, Research Group Meeting, August 2010.

University of California, Davis, PDE seminar, November 2008.

University of Oxford, England, OxPDE seminar, October, 2008.

University of California, Berkeley, Applied Math Seminar, April, 2008.

University of Chicago, Applied Math Seminar, February, 2008.
 University of Arizona, Applied Math Colloquium, February, 2008.
 University of California, San Diego, PDE Seminar, November 2007.
 University of Bonn, Germany, SFB Seminar, June 2007.
 Princeton University, Analysis Seminar, April 2007.
 New Jersey Institute of Technology, Fluid Mechanics Seminar, February 2007.
 Courant Institute, Analysis Seminar, January 2007.
 North Carolina State University, Colloquium, January 2007.
 University of California, Davis, Colloquium, January 2007.
 Indiana University, Colloquium, January 2007.
 University of Connecticut, Colloquium, December 2006.
 Colorado State University, Applied Math Seminar, October 2006.
 Trinity College, Dublin, Ireland, PDE Seminar, May 2006.
 Pennsylvania State University, Seminar, March 2006.
 Wellesley College, Mathematics Colloquium, February 2006.
 University of Colorado, Boulder, Seminar, February 2006.
 Vassar College, Mathematics Colloquium, February 2006. University of Maryland, College Park, Seminar, January 2006.
 Rutgers University, Analysis Seminar & Mathematical Physics Seminar, January 2006.
 Carnegie Mellon University, Seminar, January 2006.
 Brown University, PDE Seminar, November 2005.
 Pennsylvania State University, Pritchard Lab Seminar, October 2005.

SERVICE ACTIVITIES

Departmental Service:

Developing Mathematics Department *Learning Assistant Program*, as part of the Provost's Fellowship for Innovation of Teaching Award, recruit math majors to assist graduate teaching assistants in large discussion sections to provide active learning environment, 2015-2016.

Updating TA training course, as part of the Provost's Fellowship for Innovation of Teaching Award, incorporating active learning techniques into teaching assistant training program, 2015-2016.

Departmental Committees:

Undergraduate Program Committee, 2008-2009, 2010-2011, 2015-2016, 2016-2017.

Faculty Resources Committee, 2015-2016.

Executive Committee, Graduate Group in Applied Math, 2013-2015.

University Committees:

MPS Steering Committee, Elected departmental representative, 2016-2017.

General Education Committee, Subcommittee of Undergraduate Council, 2014-2017.

Board of Admissions & Relations with Schools, Math and Stats Advisory Expert workgroup, 2015.

Hellman Fellowship Review Panelist, 2014.

University Fellowship Review Panel, 2014.

Mentoring and Outreach:

Ph.D advisor for Chuanbin Li, graduated summer 2017, currently post-doc at Penn State

Ph.D advisor for David Stein, graduated summer 2016, currently post-doc at Simons Foundation

Postdoc Mentor, Paloma Gutierrez, UC Davis, 2017-present.

Undergraduate Research Advisor for Corina Putinar, 2012-2015 (Work resulted in publication in SUIRO, 2016).

Association for Women in Mathematics (AWM) mentor: Currently mentoring Marie Graff (Kray), Postdoc,

University of British Columbia

Mentor, First-time Mathematics Instructors, 2008, 2009, 2013, 2015, 2016.

Diversity Panelist at Conference of the Division of Fluid Dynamics, APS, 2015.

Explore Math Program Advisor (<http://www.math.ucdavis.edu/~exploration/>) 2013-2015.

Women in MPS (WMPS), Frequent speaker and attendee at Women in Mathematics and Physical Sciences events, UC Davis, ongoing

WISE (Women in Science and Engineering) Faculty Mentor Panelist, UC Davis, 2015.

Mentor, UC Berkeley Deep Dive, Berkeley Science Network, 2015.

Undergraduate Math Club advisor, 2011-2013.

SIAM Club Student Chapter advisor, 2011-2013.

Seminar for *Women in Mathematics Club* University of Minnesota, MN, May 2010.

Executive Committee:

Secretary, SIAM Analysis of PDE, January 2015-December 2016

Conference Organization:

“Non-Newtonian fluid mechanics and instabilities”, Session co-chair, Society of Rheology Annual Meeting, 2017.

“Micro-organism locomotion in complex environments from flagellar mechanics to function”, Co-chair mini symposium, SIAM Life Sciences Meeting, 2016.

“Locomotion in complex fluids”, Co-chair mini symposium, SIAM Life Sciences Meeting, 2014.

External Review Committee:

Invited external reviewer for undergraduate mathematics program (anonymous), 2016.

Referee: Archive for Rational Mechanics and Analysis, Communications in Partial Differential Equations, Communications in Pure and Applied Mathematics, Discrete and Continuous Dynamical Systems, series A, European Journal of Mechanics -B, Indiana Mathematics Journal, International Mathematics Research Notices, Journal of Differential Equations, Journal of Fluid Mechanics, Journal of Mathematical Analysis and Applications, Journal of non-Newtonian Fluid Mechanics, Nonlinear Analysis Series A, Nonlinearity, Physics Letters A, Physical Review Letters, Physical Review E, Physical Review Fluids, Proceedings of the AMS, SIAM Journal on Applied Mathematics, SIAM Journal of Mathematical Analysis, SIAM Undergraduate Research Online, Transactions of the AMS.

PROFESSIONAL MEMBERSHIPS

American Physical Society

Association for Women in Mathematics

Society for Industrial and Applied Mathematics

Society of Rheology