

Phone (803) 777-2632 • e-mail paula@math.sc.edu
Webpage: <http://www.math.sc.edu/~vasquezp/>

PAULA A. VASQUEZ

EDUCATION

2007	University of Delaware	Newark, DE
<i>Ph.D. Mathematical Sciences. Thesis Title: "Modeling Wormlike Micellar Solutions"</i>		
2002	Goldey Beacom College	Newark, DE
<i>Masters in Business Administration</i>		
1998	Universidad Nacional de Colombia	Medellin, Colombia
<i>B.S. Petroleum Engineering. Senior Thesis Title: "Packing and Drafting in Gas Pipelines"</i>		

PROFESSIONAL EXPERIENCE

2010-2013	Department of Mathematics University of North Carolina	Chapel Hill, NC
<i>Postdoctoral Fellow</i> Research in the computational and theoretical modeling of complex fluids.		
2007-2009	Department of Chemical Engineering University of Delaware	Newark, DE
<i>Postdoctoral Fellow</i> Working on a NASA funded project to study the kinetics of structure formation and low energy suspension structures of field-responsive colloidal suspensions.		
2004-2007	Department of Mathematics University of Delaware	Newark, DE
<i>Research Assistant supported by NSF-DMS #0405931</i> Pursued research interests in asymptotic methods, mathematical modeling and scientific computing. Studied a variety of problems related to complex fluids.		
2002-2004	Department of Mathematics University of Delaware	Newark, DE
<i>Teaching Assistant and Instructor during summer and winter sections</i> Teaching assistant for undergraduate courses in Calculus I for business majors, Calculus I, II, III and finite mathematics. Instructor for Calculus I, II and finite mathematics.		

PUBLICATIONS

Journals

P.A. Vasquez, J.A. Cribb, P. Moore, S. Norris, S. Shah, M.G. Forest, and R. Superfine, "Nonlinear Signatures of Entangled Polymer Solutions in Active Microbead Rheology." *Journal of Rheology*. 57(4), 1247-1264, 2013.

P.A. Vasquez, Y. Jin, K. Vuong, D.B. Hill and M.G. Forest. "A New Twist on Stokes' Second Problem: Partial Penetration of Nonlinearity in Sheared Viscoelastic Layers." *J. Non-Newtonian Fluid Mech.* 196, 36-50, 2013.

A.D. Stephens, R.A. Haggerty, P.A. Vasquez, L. Vicci, C.E. Snider, F. Shih, C. Quammen, C. Mullins, J. Haase, R.M. Taylor II, J.S. Verdaasdonk, M.R. Falvo, Y. Jin, M.G. Forest, K. Bloom. "Cohesin and Condensin form Loops of Pericentric Chromatin into a Non-linear Spring Network to Balance Microtubule-Based Force in Mitosis." *The Journal of Cell Biology*, 193(7), 1167-1180, 2013.

J.S. Verdaasdonk, P.A. Vasquez, R.M. Barry, T. Barry, S. Goodwin, M.G. Forest, K. Bloom. "Centromere tethering confines chromosome domains." *Molecular Cell Molecular Cell*, 52(6), 819-831, 2013

A.D. Stephens, C.E. Snider, J. Haase, R.A. Haggerty, P.A. Vasquez, M.G. Forest, K. Bloom. "Individual pericentromeres behave as a network in the yeast spindle." *The Journal of Cell Biology*, 203(3), 407-416, 2013.

D.B. Hill, P.A. Vasquez, J. Mellnik, S.A. McKinley, A. Vose, F. Mu, A.G. Henderson, S.H. Donaldson, N.E. Alexis, R.C. Boucher and M.G. Forest. "A Biophysical Basis for Mucus Solids Concentration as a Candidate Biomarker for Airways Disease." *PLOS ONE*, 9(2), e8768, 2014.

P.A. Vasquez, L.P. Cook, and G.H. McKinley, "Wormlike Micellar Solutions: A Scission Model and Predictions". *J. Non-Newtonian Fluid Mechanics*. v. 144(2-3), 122-139, 2007.

L. Zhou, P.A. Vasquez, G.H. McKinley and L.P. Cook. "Modeling the Inhomogeneous Response and Formation of Shear Bands in Steady and Transient Flows of Entangled Liquids". *J. Rheol.* 52(2), 591- 623, 2009.

M.W. Liberatore, F. Nettekheim, P.A. Vasquez, M.E. Helgeson, N.J. Wagner, E.W. Kaler, L.P. Cook, L. Porcar, and Y.T. Hu, "Microstructure and Shear Rheology of Entangled Wormlike Micelles in Solution". *J. Rheol.* 53(2), 441-458, 2009.

M.E. Helgeson, P.A. Vasquez, E.W. Kaler and N.J. Wagner, "Constitutive modeling and spatially-resolved structure of cetyltrimethylammonium bromide wormlike micelles through the shear banding transition". *J. Rheol.* 53(3), 727-756, 2009.

C.J. Pipe, N.J. Kim, P.A. Vasquez, L.P. Cook, and G.H. McKinley, "Wormlike Micellar Solutions II: Comparison Between Experimental Data and Scission Model Predictions." *J. Rheol.* 54(4), 881-913, 2010.

J.W. Swan, P.A. Vasquez, P.A. Whitson, E.M. Fincke, K. Wakata, S.H. Magnus, F.D. Winne, M.R. Barratt, .H. Agui J, R.D. Green, N.R. Hall, D.Y. Bohman, C.T. Bunnell, A.P. Gast, E.M. Furst, "Multi-scale kinetics of a field-directed colloidal phase transition," PNAS 109, 16023-16028, 2012.

Proceedings (Non-refereed)

Forest, M. Gregory, and Paula A. Vasquez. "Mathematical and numerical challenges in living biological materials." AIP Conference Proceedings. Vol. 1558, 2013.

Eric M. Furst, Paula A. Vasquez, J. Agui, J. Williams, D. Petit, and E. Lu, "Field-Responsive Colloidal Suspensions in Microgravity," Proceedings of the 46th AIAA Aerospace Sciences Meeting, January 5-8, 2009, Orlando, FL. AIAA 2009-955.

P.A. Vasquez, E.M. Furst, J. Agui, J. Williams, D. Petit, and E. Lu, "Structural Transitions of MR fluids in Microgravity," Proceedings of AIAA Aerospace Sciences Meeting and Exhibit, January 7-10, 2008, Reno, NV.

P.A. Vasquez and J.A. Pelesko, "A Variational Approach to Microneedle Design," Proceedings of ICMENS 2005, pp. 283.

H. Boateng, V. Elander, C. Jin, Y. Li, P.A. Vasquez and P. Fast, "Numerical Algorithms for Two Dimensional Dry Granular Flow with Deformable Elastic Grains," Proceedings of IMA Mathematics in Industry Workshop IX, August 2005.

Book chapters

Complex fluids and soft structures in the human body. (Invited). M. Gregory Forest and Paula A. Vasquez. *In preparation*

RECENT SCIENTIFIC ACTIVITIES (Since 2009)

Presentations

"Applications of mathematical modeling in biology: Modeling the human lung barrier and chromosomal DNA." Invited talk to Tulane University (October 1, 2013) and University of California at Merced (October 4, 2013)

"Microrheology and microheterogeneity of human lung mucus" Presentation at The Society of Rheology 85th Annual Meeting, October 13-17, 2013 Montréal, Québec, Canada

"Modeling nuclear chromatin in yeast cells" Presentation at The SIAM Conference on Mathematical Aspects of Materials Science, June 9-12, 2013 - Philadelphia, Pennsylvania (Invited)

"Transport properties of human lung mucus" Presentation at The Society of Rheology 84th Annual Meeting, February 10-14, 2013 - Pasadena, California

"Mathematical modeling of the mucus barrier in human lungs" Lecture in the Natural Science seminar. New College of Florida, Sarasota FL September 28, 2012. (Invited)

"Non-linear signatures of entangled polymer solutions in active microbead rheology." Presentation at the AMS 2011 Fall Western Section Meeting, University of Utah, Salt Lake City, UT October 22-23, 2011. (Invited)

"Mathematical Analysis of a "Strain Controlled - Strain Measured" Method for Active Microrheology." Presentation at the ICIAM 2011 -- 7th International Congress on Industrial and Applied Mathematics, July 18 - 22, 2011, Vancouver, BC, Canada (Invited)

"Continuum-microscopic Computation of Long-chain Rouse Linear Entangled Polymers." Presentation at the ICIAM 2011 -- 7th International Congress on Industrial and Applied Mathematics, July 18 - 22, 2011, Vancouver, BC, Canada (Invited)

Time Parallel Continuum-Kinetic-Molecular (tP-CKM) Algorithm. Molecular Models of Polymer Systems. Presentation at the Cha-Cha Days 2010, September 24 - 26, 2010, College of Charleston, Charleston, SC (Invited)

Posters

"Experimental and modeling protocols for a micro-parallel plate rheometer" Poster at The Society of Rheology 82nd Annual Meeting, October 24 - 28, 2010 . Santa Fe, New Mexico

Workshops

"Mathematical and Computational Challenges in Cilia- and Flagella-Induced Fluid Dynamics" Workshop participant, Mathematical Biosciences Institute, Columbus OH, October 15-18, 2012.

"Complex Fluids in Industry & Nature" Workshop participant, UBC, Vancouver, July 13-16, 2011.

"Careers in Academia Workshop" American Institute of Mathematics, Palo Alto, California, June 20-23, 2011.

The sixth annual Carolina Workshop on Force Measurement and Manipulation in Biological Microscopy, workshop participant, May 18-21, 2010, University of North Carolina, Chapel Hill, NC.

"Flowing Complex Fluids: Fluid Mechanics-Interaction of Microstructure and Flow." participant at workshop, Institute for Mathematics and its Applications, Minneapolis-Minnesota, October 2009".

"Flowing Complex Fluids: Rheological Measurements and Constitutive Modeling." participant at workshop, Institute for Mathematics and its Applications, Minneapolis-Minnesota, September 2009.

PROFESSIONAL ACTIVITIES

Reviewer for Journal of Non-Newtonian Fluids Mechanics, SIAM Journal of Applied Mathematics, and Journal of Micromechanics and Microengineering.

Graduate Student representative to the Graduate Studies Committee of the University of Delaware Faculty Senate. (2005-2007)

Treasurer/Co-founder SIAM Student Chapter, University of Delaware. (2006-2007)

HONORS AND AWARDS

Women in Science and Engineering (WISE) Fellowship, 2005

Travel award to the Student Chapters Meeting with SIAM leadership, Boston-Massachusetts, July 2006.

Graduate Student Travel Award from Graduate Studies Office University of Delaware, October 2006.

Graduate Student Travel Award from Society of Rheology to the 78th Society Meeting, October 2006.

AWM Travel Award to the AWM Workshop Poster Session at the joint Mathematics Meetings, New Orleans, Louisiana, January 2007.

SIAM Travel Award, ICIAM 2011