

DAVID SAINTILLAN

Mechanical and Aerospace Engineering
University of California San Diego
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La Jolla, CA 92093, USA

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RESEARCH INTERESTS

Fluid Dynamics	Soft-Matter Physics	Hydrodynamic Stability
Complex Fluids	Microfluidics	Dynamical Systems
Biological Fluid Dynamics	Biophysics	Mathematical Modeling
Microscale Transport	Electrokinetics	Scientific Computing

EDUCATION

Stanford University, Ph.D., Mechanical Engineering, 2006
Co-Advisors: Professor Eric S. G. Shaqfeh and Professor Eric Darve
Dissertation title: Collective Dynamics in Dispersions of Anisotropic and Deformable Particles

Stanford University, M.S., Mechanical Engineering, 2003

École Polytechnique, France, Diplôme d'Ingénieur, 2001

Lycée Louis-Le-Grand, France, Classes préparatoires, 1996 – 1998

ACADEMIC EMPLOYMENT

Associate Professor, Mechanical and Aerospace Engineering, University of California San Diego, 2013 – Present

Assistant Professor, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, 2008 – 2013
Faculty Affiliate in the Computational Science and Engineering Program

Associate Research Scientist, Courant Institute of Mathematical Sciences, New York University, 2006 – 2008
Postdoctoral Mentor: Professor Michael J. Shelley

HONORS AND AWARDS

Professeur Invité, Chaire Joliot, ESPCI, Paris, France, 2015, 2017

Teacher of the Year, Mechanical and Aerospace Engineering, UCSD, 2014 – 2015

National Science Foundation CAREER Award, Division of Engineering, 2012 – 2017

University of Illinois List of Teachers Ranked as Excellent by Their Students, 2008, 2009, 2010, 2011, 2012, 2013

Professeur Invité, Chaire Total-ESPCI ParisTech, ESPCI, Paris, France, July 2012

Pi Tau Sigma Gold Medal in Mechanical Engineering, 2011

Arnold O. Beckman Research Award, University of Illinois Research Board, 2010

Maitre de Conférence Invité, Aix-Marseille Université, France, July 2008

Andreas Acrivos Dissertation Award in Fluid Dynamics, American Physical Society, 2007

Courant Institute of Mathematical Sciences Postdoctoral Fellowship, 2006 – 2008

Gerald J. Lieberman Graduate Fellowship, 2005 – 2006

Edgar N. Meakin Memorial Fellowship, 2001 – 2003

Fondation de l'École Polytechnique Scholarship, 2001

REFEREED JOURNAL PUBLICATIONS

(advised students and postdocs in bold)

1. D. Saintillan, “Rheology of active fluids,” *Annual Review of Fluid Mechanics*, to appear (2018).
2. **D. Das** & D. Saintillan, “Electrohydrodynamics of viscous drops in strong electric fields: Numerical simulations,” in review (2017).
3. **M. Theillard**, **Roberto Alonso-Matilla** & D. Saintillan, “Geometric control of active collective motion,” *Soft Matter*, **13** 363–375 (2017).
4. **D. Das** & D. Saintillan, “A nonlinear small-deformation theory for transient droplet electrohydrodynamics,” *Journal of Fluid Mechanics*, **810** 225–253 (2017).
5. **R. Alonso-Matilla**, **B. Ezhilan** & D. Saintillan, “Microfluidic rheology of active particles suspensions: Kinetic theory,” *Biomicrofluidics*, **10** 043505 (2016).
★ Invited article, special issue on “Microfluidic Rheology”
6. **H. Manikantan** & D. Saintillan, “Effect of flexibility on the growth of concentration fluctuations in a suspension of sedimenting fibers: Particle simulations,” *Physics of Fluids*, **28** 013303 (2016).
7. **H. Manikantan** & D. Saintillan, “The buckling transition of a semiflexible filament in extensional flow,” *Physical Review E: Rapid Communications*, **92** 041002 (2015).
8. **B. Ezhilan**, **R. Alonso-Matilla** & D. Saintillan, “On the distribution and swim pressure of run-and-tumble particles in confinement,” *Journal of Fluid Mechanics: Rapids*, **781** R4 (2015).
9. T. Brotto, D. Bartolo & D. Saintillan, “Spontaneous flows in suspensions of active cyclic swimmers,” *Journal of Nonlinear Science*, **5** 1125–1139 (2015).
★ Invited article, special issue on “Emergent Collective Behavior”
10. R. Dong, J. Li, I. Rozen, **B. Ezhilan**, T. Xu, C. Christianson, W. Gao, D. Saintillan, B. Ren & J. Wang, “Vapor-driven propulsion of catalytic micromotors,” *Scientific Reports*, **5** 13226 (2015).
11. **B. Ezhilan** & D. Saintillan, “Transport of a dilute active suspension in pressure-driven channel flow,” *Journal of Fluid Mechanics*, **777** 482–522 (2015).
12. A. Bricard, J.-B. Caussin, O. Chepizhko, **D. Das**, C. Savoie, V. Chikkadi, F. Peruani, D. Saintillan & D. Bartolo, “Emergent vortices in populations of colloidal rollers,” *Nature Communications*, **6** 7470 (2015).
13. **B. Ezhilan**, W. Gao, A. Pei, I. Rozen, R. Dong, B. Jurado-Sánchez, J. Wang & D. Saintillan, “Motion-based threat detection using microrods: Experiments and numerical simulations,” *Nanoscale*, **7** 7833–7840 (2015).
14. **H. Manikantan**, L. Li, S. E. Spagnolie & D. Saintillan, “The instability of a sedimenting suspension of weakly flexible fibres,” *Journal of Fluid Mechanics*, **756** 935–964 (2014).
15. J. Orozco, B. Jurado-Sánchez, G. Wagner, W. Gao, R. Vazquez-Duhalt, S. Sattayasamitsathit, M. Galarnyk, A. Cortés, D. Saintillan & J. Wang, “Bubble-propelled micromotors for enhanced transport of passive tracers,” *Langmuir*, **30** 5082–5087 (2014).
16. **A. Lefauve** & D. Saintillan, “Globally aligned states and hydrodynamic traffic jams in confined suspensions of active asymmetric particles,” *Physical Review E: Rapid Communications*, **89** 021002 (2014).
17. L. Li, **H. Manikantan**, D. Saintillan & S. Spagnolie, “The sedimentation of flexible filaments,” *Journal of Fluid Mechanics*, **735** 705–736 (2013).
18. D. Saintillan & M. J. Shelley, “Active suspensions and their nonlinear models,” *Comptes Rendus Physique*, **14** 497–517 (2013).
★ Invited review, thematic issue on “Living Fluids”.

19. **B. Ezhilan**, M. J. Shelley & D. Saintillan, “Instabilities and nonlinear dynamics of concentrated active suspensions,” *Physics of Fluids*, **25** 070607 (2013).
 - ★ Invited article, special section on “Mobile Particulate Systems”
 - ★ Also featured on the cover of the July 2013 issue of *Physics of Fluids*
20. **H. Manikantan** & D. Saintillan, “Subdiffusive transport of fluctuating elastic filaments in cellular flows,” *Physics of Fluids*, **25** 073603 (2013).
21. **D. Das** & D. Saintillan, “Electrohydrodynamic interaction of spherical particles under Quincke rotation,” *Physical Review E*, **87** 043014 (2013).
22. **B. Ezhilan**, **A. Alizadeh Pahlavan** & D. Saintillan, “Chaotic dynamics and oxygen transport in thin films of aerotactic bacteria,” *Physics of Fluids* **24** 091701 (2012).
23. **R. Vishnampet** & D. Saintillan, “Concentration instability of sedimenting spheres in a second-order fluid,” *Physics of Fluids* **24** 073302 (2012).
24. D. Saintillan & M. J. Shelley, “Emergence of coherent structures and large-scale flows in motile suspensions,” *Journal of the Royal Society Interface* **9** 571–585 (2012).
25. **J. S. Park** & D. Saintillan, “From diffusive dynamics to local aggregation: Effect of surface contamination in diplophoresis,” *Soft Matter* **7** 10720 (2011).
26. J. G. Gibbs, **S. Kothari**, D. Saintillan & Y.-P. Zhao, “Geometrically designing the kinematic behavior of catalytic nanomotors,” *Nano Letters* **11** 2543–2550 (2011).
27. **J. S. Park** & D. Saintillan, “Electric-field-induced ordering and pattern formation in colloidal suspensions,” *Physical Review E* **83** 041409 (2011).
28. **A. Alizadeh Pahlavan** & D. Saintillan, “Instability regimes in flowing suspensions of swimming micro-organisms,” *Physics of Fluids*, **23** 011901 (2011).
 - ★ Also featured in the “Research Highlights” on the *Physics of Fluids* website, January 2011
29. D. Saintillan, “The dilute rheology of swimming suspensions: A simple kinetic model,” *Experimental Mechanics* **50** 1275–1281 (2010).
 - ★ Invited article, special issue on “Mechanical Aspects of Biological Locomotion”
30. **J. S. Park** & D. Saintillan, “Diplophoresis in large-scale suspensions of ideally polarizable spheres,” *Journal of Fluid Mechanics* **662** 66-90 (2010).
31. D. Saintillan, “Extensional rheology of active suspensions,” *Physical Review E* **81** 056307 (2010).
 - ★ Also featured in *Physical Review E*’s “Kaleidoscope”, <http://pre.aps.org/kaleidoscope/May2010>
32. **F. Pignatelli**, M. Nicolas, E. Guazzelli & D. Saintillan, “Falling jets of particles in viscous fluids,” *Physics of Fluids* **21** 123303 (2009).
 - ★ Also featured on the cover of the December 2009 issue of *Physics of Fluids*
33. K. A. Rose, B. Hoffman, D. Saintillan, E. S. G. Shaqfeh & J. G. Santiago, “Hydrodynamic interactions in metal rod-like particle suspensions due to induced charge electrophoresis,” *Physical Review E* **79** 011402 (2009).
34. D. Saintillan & M. J. Shelley, “Instabilities, pattern formation and mixing in active suspensions,” *Physics of Fluids* **20** 123304 (2008).
 - ★ Also selected to appear in the *Virtual Journal of Biological Physics Research*, January 1 2009
35. D. Saintillan, “Nonlinear interactions in electrophoresis of ideally polarizable particles,” *Physics of Fluids* **20** 067104 (2008).
36. D. Saintillan & M. J. Shelley, “Instabilities and pattern formation in active particle suspensions: Kinetic theory and continuum simulations,” *Physical Review Letters* **100** 178103 (2008).
 - ★ Also selected to appear in the *Virtual Journal of Biological Physics Research*, May 1 2008

37. D. Saintillan & M. J. Shelley, “Orientational order and instabilities in suspensions of self-locomoting rods,” *Physical Review Letters* **99** 058102 (2007).
 ★ Also selected to appear in the *Virtual Journal of Biological Physics Research*, August 1 2007
38. D. Saintillan, E. S. G. Shaqfeh & E. Darve, “Stabilization of a suspension of sedimenting rods by induced-charge electrophoresis,” *Physics of Fluids* **18** 121701 (2006).
 ★ Invited article, special section on “Interactions for dispersed systems in Newtonian and viscoelastic fluids”
39. D. Saintillan, E. S. G. Shaqfeh & E. Darve, “The effect of stratification on the wave number selection in the instability of sedimenting spheroids,” *Physics of Fluids* **18** 121503 (2006).
40. D. Saintillan, E. Darve & E. S. G. Shaqfeh, “Hydrodynamic interactions in the induced-charge electrophoresis of colloidal rod dispersions,” *Journal of Fluid Mechanics* **563** 223–259 (2006).
41. D. Saintillan, E. S. G. Shaqfeh & E. Darve, “Effect of flexibility on the shear-induced migration of short-chain polymers in parabolic channel flow,” *Journal of Fluid Mechanics* **557** 297–306 (2006).
42. D. Saintillan, E. S. G. Shaqfeh & E. Darve, “The growth of concentration fluctuations in dilute dispersions of orientable and deformable particles under sedimentation,” *Journal of Fluid Mechanics* **553** 347–388 (2006).
43. D. Saintillan, E. Darve & E. S. G. Shaqfeh, “A smooth particle-mesh Ewald algorithm for Stokes suspension simulations: the sedimentation of fibers,” *Physics of Fluids* **17** 033301 (2005).

BOOK CHAPTERS

1. D. Saintillan & M. J. Shelley, “Theory of active suspensions,” in *Complex Fluids in Biological Systems*, S. Spagnolie (ed.), Springer (2015).
2. D. Saintillan, “Kinetic models for biologically active suspensions,” in IMA Volume on *Natural Locomotion in Fluids and on Surfaces: Swimming, Flying, Sliding*, S. Childress, A. Hosoi, W. W. Schultz, Z. J. Wang (eds.), Springer (2012).

REFEREED CONFERENCE PROCEEDINGS

1. J. S. Park & D. Saintillan, “Direct numerical simulations of electrophoretic deposition of charged colloidal suspensions,” *Proceedings of the 4th International Conference on Electrophoretic Deposition*, in *Key Engineering Materials* **507** 47 (2012).
 ★ Also featured on the cover of the same issue of *Key Engineering Materials*
2. F. Pignatel, M. Nicolas, E. Guazzelli & D. Saintillan, “Instabilité d’un jet de particules dans un fluide visqueux,” *19ème Congrès Français de Mécanique*, Marseille, France, August 24–28 2009.
3. D. Saintillan, E. Darve & E. S. G. Shaqfeh, “Microstructure in the sedimentation of orientable and deformable particles,” *ASME International Mechanical Engineering Congress and Exposition*, Orlando, FL, November 5–11 2005 (IMECE2005–80119).
4. D. Saintillan, E. Darve & E. S. G. Shaqfeh, “Induced-charge electrophoresis in suspensions of rodlike particles: theory and simulations,” *ASME International Mechanical Engineering Congress and Exposition*, Orlando, FL, November 5–11 2005 (IMECE2005–80104).
5. D. Saintillan, E. Darve & E. S. G. Shaqfeh, “Dynamic simulations of the instability of sedimenting fibers,” *Proceedings of the 21st International Congress of Theoretical and Applied Mechanics (ICTAM)*, Warsaw, Poland, August 15–21 2004 (Springer).

NON-REFEREED PUBLICATIONS

1. E. Kanso, D. Saintillan, “Emergent collective behavior: From fish schools to bacterial colonies,” *Journal of Nonlinear Science*, **25** 1051–1052 (2015).
 ★ Special issue editorial note

2. D. Saintillan, “Swimming in shear,” *Journal of Fluid Mechanics*, **744** 1–4 (2014).
★ Invited “Focus on Fluids” article
3. P. R. Nott, R. H. Davis, M. Reeks, D. Saintillan, S. Sundaresan, “Report on IUTAM Symposium on Mobile Particulate Systems: Kinematics, rheology and complex phenomena,” *Physics of Fluids*, **25** 070501 (2013).
4. D. Saintillan, “A quantitative look into microorganism hydrodynamics,” *Physics* **3** 84 (2010).
★ Invited “Viewpoint” article

INVITED SEMINAR TALKS

- 2016 Applied and Engineering Physics Seminar, Cornell University, Ithaca, NY
Penn Institute of Computational Science Colloquium, University of Pennsylvania, Philadelphia, PA
Swiss Federal Institute of Technology (ETHZ), Zürich, Switzerland
Fluid Mechanics Seminar, Brown University, Providence, RI
Applied Math Lab Seminar, Courant Institute, New York University, New York, NY
- 2015 Physics Colloquium, Laboratoire de Physique, École Normale Supérieure de Lyon, Lyon, France
Biophysics Seminar, École Normale Supérieure, Paris, France
Fluid Mechanics Seminar, Stanford University, Palo Alto, CA
Quantitative Biology (qBio) Seminar, University of California San Diego, La Jolla, CA
Fluid Mechanics Seminar, University of California Los Angeles, Los Angeles, CA
- 2014 Fluid Mechanics Seminar, University of British Columbia, Vancouver, BC, Canada
GALCIT Colloquium, California Institute of Technology, Pasadena, CA
Biophysics Seminar, Center for Theoretical Biological Physics, University of California San Diego, La Jolla, CA
Fluid Mechanics Seminar, University of California Santa Barbara, Santa Barbara, CA
Department of Aerospace and Mechanical Engineering, University of Southern California, Los Angeles, CA
- 2013 Department of Engineering Sciences and Applied Mathematics, Northwestern University, Evanston, IL
Department of Mechanical Engineering, University of Washington, Seattle, WA
Fluid Mechanics Seminar, University of Illinois at Urbana-Champaign, Urbana, IL
Fluid Mechanics Seminar, University of California San Diego, La Jolla, CA
- 2012 Institute for Computational Engineering and Science Seminar, University of Texas, Austin, TX
Applied and Computational Mathematics Seminar, University of Wisconsin, Madison, WI
École Supérieure de Physique et de Chimie Industrielles, Paris, France
Fluid Mechanics Seminar, Brown University, Providence, RI
- 2011 Applied Physics and Applied Mathematics Seminar, Columbia University, New York, NY
Mathematics and Its Applications Seminar, University of Illinois at Chicago, Chicago, IL
École Supérieure de Physique et de Chimie Industrielles, Paris, France
Laboratoire d’Hydrodynamique (LadHyX), École Polytechnique, Palaiseau, France
- 2010 Mechanical Engineering Graduate Seminar, University of Iowa, Iowa City, IA
IUSTI Seminar, Polytech’ Marseille, Centre National de la Recherche Scientifique, Marseille, France
Materials Science Division, Argonne National Laboratory, Argonne, IL
Mechanical and Aerospace Engineering Seminar, Polytechnic Institute of NYU, Brooklyn, NY
- 2009 Fluid Mechanics Seminar, University of Illinois at Urbana-Champaign, Urbana, IL
- 2008 Applied Mathematics Seminar, Courant Institute, New York University, New York, NY
Mechanical Engineering and Applied Mechanics Seminar, University of Pennsylvania, Philadelphia, PA
- 2007 Fluid Mechanics Seminar, New Jersey Institute of Technology, Newark, NJ
Applied Math Lab Seminar, Courant Institute, New York University, New York, NY
Fluid Mechanics Seminar, Benjamin Levich Institute for Physicochemical Hydrodynamics, New York, NY
- 2006 Mechanical and Aerospace Engineering, Rutgers University, Piscataway, NJ
Applied Math Lab Seminar, Courant Institute, New York University, New York, NY

INVITED CONFERENCE AND WORKSHOP TALKS

- 2017 Workshop on Modeling Complex Fluids for Biological Applications, University of Utah, Salt Lake City, UT
Flatiron Institute Workshop on Biological Active Matter, Simons Foundation, New York City, NY
Workshop on Physics of Microfluidics, Sde Boker, Israel
- 2016 DFG International Conference on Microswimmers, Bonn, Germany
Summer School on Living and Active Soft Matter, Corsica, France
Workshop on Active and Smart Matter, Syracuse University, NY
Workshop on Fluid Mechanics and Collective Behavior, Ascona, Switzerland (keynote)
- 2015 Society of Engineering Science Technical Meeting, College Station, TX
- 2014 Workshop on “Active fluids: Bridging Complex Fluids and Biofluids”, Aspen Center for Physics, Aspen, CO
- 2013 International Symposium on Nonlinear Theory and its Applications, Santa Fe, NM
Annual Congress of the Canadian Association of Physicists, Montreal, Canada
- 2012 NYU-Tulane FRG Workshop, New York University, New York, NY
IUTAM Symposium on Mobile Particulate Systems, Bangalore, India
- 2011 Workshop on Individual and Collective Dynamics in Active Suspensions, Institut Henri Poincaré, Paris, France
SIAM Conference on Applications of Dynamical Systems, Snowbird, UT
SIAM Conference on Computational Science and Engineering, Reno, NV
Workshop on Electrokinetic Phenomena in Nanocolloids and Nanofluidics, Technion, Israel
- 2010 IMA Workshop on Natural Locomotion in Fluids and on Surfaces, Minneapolis, MN
SIAM conference on Mathematical Aspects of Materials Science, Philadelphia, PA
- 2009 SIAM Conference on Computational Science and Engineering, Miami, FL
- 2008 American Physical Society March Meeting, New-Orleans, LA
- 2007 Andreas Acrivos Award Lecture, 60th APS Division of Fluid Dynamics Annual Meeting, Salt Lake City, UT
Notions of Biological Locomotion Workshop, Aspen Center for Physics, Aspen, CO
Self-Organization Workshop, Argonne National Laboratory, Argonne, IL

CONTRIBUTED CONFERENCE ABSTRACTS

- 2016 68th Annual Meeting of the APS Division of Fluid Dynamics, Portland, OR
MechBio Symposium, University of California San Diego, La Jolla, CA
SIAM Annual Meeting, Boston, MA
SIAM conference on Parallel Processing for Scientific Computing, Paris, France
- 2015 67th Annual Meeting of the APS Division of Fluid Dynamics, Boston, MA
Bifurcations and Instabilities in Fluid Dynamics, Paris, France
Fluid & Elasticity Meeting, Biarritz, France
- 2014 67th Annual Meeting of the APS Division of Fluid Dynamics, San Francisco, CA
81st Annual Meeting of the Society of Rheology, Philadelphia, PA
SIAM Annual Meeting, Chicago, IL
- 2013 66th Annual Meeting of the APS Division of Fluid Dynamics, Pittsburgh, PA
50th Annual Technical Meeting of the Society of Engineering Science, Providence, RI
- 2012 65th Annual Meeting of the APS Division of Fluid Dynamics, San Diego, CA
Fluid & Elasticity Meeting, La Jolla, CA
Annual Meeting of the American Institute of Chemical Engineers, Pittsburgh, PA
23rd International Congress on Theoretical and Applied Mechanics, Beijing, China
SoftFlow 2012, Complex Biological Fluids, Cargèse, Corsica, France

- ICREA Symposium on Nanofluidics, Colloids and Membranes, Barcelona, Spain
86th Annual ACS Colloid and Surface Science Symposium, Baltimore, MD
- 2011 64th Annual Meeting of the APS Division of Fluid Dynamics, Baltimore, MD
48th Annual Technical Conference of the Society of Engineering Science, Evanston, IL
4th International Conference on Electrophoretic Deposition, Puerto Vallarta, Mexico
- 2010 63rd Annual Meeting of the APS Division of Fluid Dynamics, Long Beach, CA
Annual meeting of the American Electrophoresis Society, Salt Lake City, UT
47th Annual Technical Meeting of the Society of Engineering Science, Ames, IA
Frontiers in Applied and Computational Mathematics, Newark, NJ
American Physical Society March Meeting, Portland, OR
- 2009 62nd Annual Meeting of the APS Division of Fluid Dynamics, Minneapolis, MN
Annual Meeting of the American Institute of Chemical Engineers, Nashville, TN
81st Annual Meeting of the Society of Rheology, Madison, WI
Fluid & Elasticity Meeting, Carry-Le-Rouet, France
- 2008 61st Annual Meeting of the APS Division of Fluid Dynamics, San Antonio, TX
Annual Meeting of the American Institute of Chemical Engineers, Philadelphia, PA
45th Annual Technical Meeting of the Society of Engineering Science, Urbana-Champaign, IL
- 2007 60th Annual Meeting of the APS Division of Fluid Dynamics, Salt Lake City, UT
- 2006 59th Annual Meeting of the APS Division of Fluid Dynamics, Tampa Bay, FL
78th Annual Meeting of the Society of Rheology, Portland, ME
15th U.S. National Congress on Theoretical and Applied Mechanics, Boulder, CO
- 2005 58th Annual Meeting of the APS Division of Fluid Dynamics, Chicago, IL
ASME International Mechanical Engineering Congress and Exposition, Orlando, FL
Annual Meeting of the American Institute of Chemical Engineers, Cincinnati, OH
SIAM Symposium on Current Research in Engineering and Applied Mathematics, Stanford, CA
- 2004 57th Annual Meeting of the APS Division of Fluid Dynamics, Seattle, WA
21st International Congress of Theoretical and Applied Mechanics, Warsaw, Poland

ACADEMIC TEACHING

At the University of California San Diego:

- WINTER 2017: MAE 210A Fluid Dynamics I – graduate course, 25 students
SPRING 2016: MAE 108 Probabilities and Statistics for Engineers – undergraduate course, 103 students
WINTER 2016: MAE 210B Fluid Dynamics II – graduate course, 63 students
FALL 2015: MAE 105 Introduction to Mathematical Physics – undergraduate course, 145 students
SPRING 2015: MAE 108 Probabilities and Statistics for Engineers – undergraduate course, 70 students
WINTER 2015: MAE 207 Complex and Biological Fluids – graduate course, 7 students
FALL 2014: MAE 210A Fluid Dynamics I – graduate course, 47 students
SPRING 2014: MAE 210C Fluid Dynamics III – graduate course, 19 students

At the University of Illinois:

- FALL 2013: TAM 435 Intermediate Fluid Dynamics – undergraduate/graduate course, 36 students
SPRING 2013: TAM 335 Introductory Fluid Dynamics – undergraduate course, 141 students
FALL 2012: TAM 435 Intermediate Fluid Dynamics – undergraduate/graduate course, 27 students
SPRING 2012: TAM 536 Instability and Transition – graduate course, 11 students
FALL 2011: TAM 435 Intermediate Fluid Dynamics – undergraduate/graduate course, 26 students

SPRING 2011: TAM 335 Introductory Fluid Dynamics – undergraduate course, 117 students
FALL 2010: TAM 435 Intermediate Fluid Dynamics – undergraduate/graduate course, 17 students
SPRING 2010: TAM 542 Mathematical Methods II – graduate course, 39 students
FALL 2009: TAM 541 Mathematical Methods I – graduate course, 52 students
SPRING 2009: TAM 542 Mathematical Methods II – graduate course, 17 students
FALL 2008: TAM 541 Mathematical Methods I – graduate course, 28 students

SHORT COURSES

1. “Fluid mechanics of active suspensions,” *Advanced School on: “Flowing Soft Matter: Bridging the Gap between Statistical Physics and Fluid Mechanics”*, International Center for Mechanical Sciences, Udine, Italy, June 30 – July 4 2014 (3 lectures).
2. “Fluid mechanics of biologically active suspensions,” *SoftFlow 2012, Summer School on Biological Complex Fluids*, Cargèse, Corsica, France, June 25 – July 7 2012 (2 lectures).
3. “Electrokinetic phenomena in particulate suspensions: an introduction,” *Tutorial on Mathematics of Microfluidic Transport Phenomena*, Institute for Mathematics and its Applications, Minneapolis, MN, December 5 2009 (1 lecture).

CURRENT RESEARCH ADVISEES

Maxime Theillard, Postdoctoral Researcher, 2014 – Present

Previous Institution: University of California Santa Barbara

Roberto Alonso-Matilla, Ph.D. Candidate in Mechanical Engineering, 2014 – Present

Previous institution: University of Valladolid, Spain

Brato Chakrabarti, Ph.D. Candidate in Mechanical Engineering, 2015 – Present

Previous institution: Virginia Tech, VA

Achal Mahajan, Ph.D. Candidate in Mechanical Engineering, 2016 – Present

Previous institution: Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India

Yixuan Jia, M.S. Candidate in Mechanical Engineering, 2015 – Present

Previous institution: Southeastern University, Nanjing, China

Piyush Prakash, M.S. Candidate in Mechanical Engineering, 2016 – Present

Previous institution: University of California Berkeley, CA

PAST RESEARCH ADVISEES

Debasish Das, Ph.D. in Mechanical Engineering, 2016

Ph.D. Thesis: Electrohydrodynamics of particles and drops in strong electric fields

Current position: Postdoctoral Researcher at Cambridge University, United Kingdom (Mentor: Eric Lauga)

Barath Ezhilan, Ph.D. in Engineering Sciences, 2016

Ph.D. Thesis: Fluid dynamics of active suspensions: Effects of interparticle interactions, external fields and confinement

Current position: Data Scientist, Amazon

Harishankar Manikantan, Ph.D. in Applied Mechanics, 2015

Ph.D. Thesis: Bending, buckling, tumbling, trapping: Viscous dynamics of elastic filaments

Current position: Postdoctoral Researcher at the University of California Santa Barbara (Mentor: Todd M. Squires)

Jae Sung Park, Ph.D. in Mechanical Engineering, 2012

Ph.D. Thesis: Collective behavior of colloidal suspensions under electric fields and confinement

Current position: Assistant Professor, University of Nebraska Lincoln, NE

Ku Da, M.S. in Mechanical Engineering, 2013

Thesis: A study of electrochemical transport and diffuse charge dynamics in nanoscale devices using a Langevin equation

Current position: Mechanical Engineer, 3M

Ramanathan Vishnampet, M.S. in Mechanical Engineering, 2012

Research project: Large-scale numerical simulations of sedimentation in viscoelastic fluids

Current position: Ph.D. Candidate in Mechanical Engineering, University of Illinois at Urbana-Champaign

Shrenik Kothari, M.S. in Mechanical Engineering, 2011

M.S. Thesis: Modeling the dynamics of autonomous catalytic nanomotors using the method of regularized Stokeslets

Current position: Engineer, Thermal and Fluid Core Competency Group, Intel Corporation

Karthik Chikmagalur, M.S. in Theoretical and Applied Mechanics, 2011

M.S. Thesis: A study of electrochemical transport and diffuse charge dynamics using a Langevin equation

Current position: Engineer, General Electric Aviation, Bangalore, India

Qizheng Yan, M.S. in Mechanical Engineering, 2010

Research project: Optimization of chaotic mixing by body forces in Stokes fluid flows

Zhengyang Cheng, M.S. in Mechanical Engineering, 2010

Research Project: Simulations of suspensions of self-propelled particles using a point-particle model

Current position: Ph.D. Candidate in Civil and Environmental Engineering, University of Iowa

Amir Alizadeh Pahlavan, M.S. in Theoretical and Applied Mechanics, 2010

M.S. Thesis: Collective dynamics in flowing suspensions of swimming micro-organisms

Current position: Ph.D. Candidate in Mechanical Engineering, Massachusetts Institute of Technology

Danny K. Chan, B.S. in Chemical Engineering, 2016

Research Project: Effective rheology in suspensions of particles undergoing Quincke electrorotation

Maxime Bollard, Visiting Undergraduate Intern, 2014 – 2015

Research Project: Effective dispersion of microswimmers in pressure-driven flow

Current Institution: Ecole Centrale Lyon, France

Adrien Lefauve, Visiting Undergraduate Intern, 2013

Research Project: Theory and simulations of strongly confined active suspensions

Current position: Ph.D. Candidate, Cambridge University, Cambridge, U.K.

Arjun Sharma, Undergraduate Student Researcher, 2013

Research Project: Active suspensions in stratified fluids

Current position: M.S. Candidate, Brown University

Thomas W. King, B.S. in Mechanical Engineering, 2012

Research Project: Motility transition of bacterial suspensions in oxygen gradients

Current position: Accenture, Chicago

SERVICE AND ACTIVITIES

EXTERNAL SERVICE

Member of the Nominating Committee, American Physical Society Division of Fluid Dynamics, 2016 – 2018

Proposal Reviewer, Deutsche Forschungsgemeinschaft (German National Research Agency), 2016

Proposal Reviewer, American Chemical Society Petroleum Research Fund, 2009, 2014, 2016

Panel Reviewer, National Science Foundation Division of Engineering, 2010, 2012, 2013, 2014, 2016

Proposal Reviewer, European Research Council, 2013, 2015

Proposal Reviewer, Nederlandse Organisatie voor Wetenschappelijk Onderzoek (Dutch National Research Agency), 2015

Proposal Reviewer, Agence Nationale de la Recherche (French National Research Agency), 2015

Proposal Reviewer, German-Israeli Foundation for Scientific Research and Development, 2014

Poster Session Judge for the Gallery of Fluid Motion, American Physical Society Division of Fluid Dynamics, 2013

Member of the External Affairs Committee, American Physical Society Division of Fluid Dynamics, 2012 – 2014

Poster Session Judge, Annual Meeting of the American Physical Society Division of Fluid Dynamics, 2012

Proposal Reviewer, Israel Science Foundation, 2009, 2012

Proposal Reviewer, Department of Energy Office of Basic Science, 2012

Member of the Scholarship Selection Committee, Pi Tau Sigma, 2012

Panel Reviewer, National Science Foundation Division of Mathematical Sciences, 2011
Book review for Springer Verlag, 2010
Member of the François Frenkiel Award Committee, American Physical Society Division of Fluid Dynamics, 2009 – 2010
Poster Session Judge for the Gallery of Fluid Motion, American Physical Society Division of Fluid Dynamics, 2010
Member of the Selection Committee, Programme de bourses d'enseignement en génie et en administration dans les universités québécoises, 2009
Proceeding Reviewer for International Mechanical Engineering Congress and Exposition, 2005

EDITORSHIP

Guest Co-Editor (with E. Kanso), Special Issue of *Journal of Nonlinear Science* on “Emergent Collective Behavior”, 2015

CONFERENCE SESSION CHAIR AND ORGANIZER

Conference Organizer, 11th Southern California Flow Physics Symposium (So Cal Fluids XI), University of California San Diego, La Jolla, CA, April 22 2017
Session Co-Organizer (with C. Wagner), “Biorheology and Active Fluids” , 88th Annual Meeting of the Society of Rheology, Tampa, FL, February 12-16 2017
Session Chair, 69th Annual Meeting of Division of Fluid Dynamics, American Physical Society, Portland, OR, November 19–22 2016
Focus Session Organizer, “Electrohydrodynamics of Drops, Vesicles and Membranes” , 68th Annual Meeting of Division of Fluid Dynamics, American Physical Society, Boston, MA, November 22-24 2015
Topical Session Co-Organizer (with O. du Roure), 6th International Symposium on Bifurcations and Instabilities in Fluid Dynamics , ESPCI ParisTech, Paris, France, July 15–17 2015
Conference Co-Organizer (with G. Jacobs, X. Liu, I. Battiato, A. E. Marsden), 9th Southern California Flow Physics Symposium (So Cal Fluids IX), San Diego State University, San Diego, CA, 2015
Session Chair (2 sessions), 67th Annual Meeting of Division of Fluid Dynamics, American Physical Society, San Francisco, CA, November 23–25 2014
Summer School Co-Organizer (with D. Bartolo), “Flowing Soft Matter: Bridging the Gap between Statistical Physics and Fluid Mechanics,” 2014 Summer School, International Center for Mechanical Sciences, Udine, Italy, June 30 – July 4 2014
Session Chair, 8th Southern California Flow Physics Symposium (So Cal Fluids VIII), University of California Los Angeles, Los Angeles, CA, April 12 2014
Conference Co-Organizer (with A. Ardekani, Y. Renardy, J. Zhang, E. Lauga), “Active Fluids: Bridging Complex Fluids and Biofluids,” 2014 Winter Conference, Aspen Center for Physics, Aspen, CO, January 27 – February 1 2014
Session Chair, 66th Annual Meeting of Division of Fluid Dynamics, American Physical Society, Pittsburgh, PA, November 24–26 2013
Symposium Co-Organizer (with A. Khair), “Electrohydrodynamics and Electrokinetics of Fluid Systems,” 50th Annual Technical Meeting of the Society of Engineering Science, Providence, RI, July 28–31, 2013
Session Chair, 65th Annual Meeting of Division of Fluid Dynamics, American Physical Society, San Diego, CA, November 18–20 2012
Session Co-Chair, 23rd International Congress on Theoretical and Applied Mechanics, Beijing, China, August 19–24 2012
Session Chair, ICREA Symposium on Nanofluidics, Colloids and Membranes, Barcelona, Spain, July 16–18 2012
Session Chair, 48th Annual Conference of the Society of Engineering Sciences, Evanston, IL, October 12–14 2011
Session Chair, Workshop on Electrokinetic Phenomena in Nanocolloids, Technion, Israel, December 19–23 2010
Session Chair, 63rd Annual Meeting of Division of Fluid Dynamics, American Physical Society, Long Beach, CA, November 21–23 2010
Symposium Organizer, “Dynamics and Rheology of Complex Fluids”, 47th Annual Technical Meeting of the Society of Engineering Science, Ames, IA, October 4–6 2010
Session Chair, 62nd Annual Meeting of Division of Fluid Dynamics, American Physical Society, Minneapolis, MN, November 22–24 2009

Symposium Co-Organizer (with J. Bławdziewicz), “Complex Multiphase Flows”, 2009 Annual meeting of the American Institute of Chemical Engineers, Nashville, TN, November 8–13 2009
Session Chair, 59th Annual Meeting of Division of Fluid Dynamics, American Physical Society, Tampa, FL, November 19–21 2006

REVIEWER FOR ARCHIVED JOURNALS

Analytical Chemistry (2009), Applied Physics Letters (2014), Biophysical Journal (2013), Chemical Engineering Communications (2008), Chemical Engineering Science (2012), European Journal of Mechanics B/Fluids (2012), European Journal of Physics (2012), European Physical Journal (2015), Experimental Mechanics (2009), Experiments in Fluids (2010), Journal of Chemical Physics (2011, 2015), Journal of Computational Physics (2005, 2009–2011, 2013–2015), Journal of Fluids Engineering (2006), Journal of Fluid Mechanics (2005–2016), Journal of Fluids and Structures (2013, 2014, 2015), Journal of Nonlinear Science (2008, 2014, 2015), Journal of Non-Newtonian Fluid Mechanics (2005, 2006), Journal of Plankton Research (2013), Journal of Rheology (2009, 2012, 2016), Journal of the Royal Society Interface (2009), Langmuir (2010, 2012, 2014, 2015), Macromolecules (2009), Mechanics Research Communications (2011), Multiscale Modeling and Simulation (2012), Nanoscale (2015), Nature (2013), New Journal of Physics (2010, 2013), Physics of Fluids (2007–2015), Physical Review E (2007–2014), Physical Review Fluids (2016) Physical Review Letters (2007–2013, 2015), Proceedings of the National Academy of Science of the USA (2014, 2015, 2017), Proceedings of the Royal Society A (2009), Quarterly Journal of Mechanics and Applied Mechanics (2010), Reviews of Modern Physics (2010), Rheologica Acta (2014), Scientific Reports (2015), Soft Matter (2011, 2012, 2015), SIAM Journal on Applied Dynamical Systems (2011), SIAM Journal on Applied Mathematics (2014).

INTERNAL SERVICE

At the University of California San Diego:

Vice-Chair of the Graduate Affairs Committee, Mechanical and Aerospace Engineering, 2016 – Present
Departmental TA Advisor, Mechanical and Aerospace Engineering, 2016 – Present
Organizer, Biomechanics and Mechanobiology Seminar series, Fall 2014, Fall 2015
Organizer, Fluid Mechanics and Combustion Seminar series, Winter 2015
Member of the External Affairs Committee, Mechanical and Aerospace Engineering, 2014 – Present
Member of the Undergraduate Affairs Committee, Mechanical and Aerospace Engineering, 2014

At the University of Illinois at Urbana-Champaign:

Member of the Departmental Advisory Committee, Mechanical Science and Engineering Department, 2011 – 2013
Member of the Departmental Seminar Committee, Mechanical Science and Engineering Department, 2008 – 2013
Member of the Communications Advisory Group, Mechanical Science and Engineering Department, 2011 – 2012
Member of the Fellowship Committee, University of Illinois Computational Science and Engineering Program, 2009

PH.D. DISSERTATION COMMITTEES

At the University of California San Diego:

Benjamin Ciotti, Department of Mathematics
Ching Chang, Department of Mechanical and Aerospace Engineering
Daniel Moreno Boza, Department of Mechanical and Aerospace Engineering
Bengu Ozge Akyurek, Department of Mechanical and Aerospace Engineering
Erica Rosenblum, Scripps Institution of Oceanography
Mehrdad Yousefzadeh, Department of Mechanical and Aerospace Engineering
Jixing Li, Department of Nanoengineering
Edward Ronan, Department of Physics
Bryce G. Inman, Scripps Institution of Oceanography
Josh Villanueva, Department of Nanoengineering (defended 2016)
Bowen Ling, Department of Mechanical and Aerospace Engineering (defended 2016)
Soren Taverniers, Department of Mechanical and Aerospace Engineering (defended 2016)
Cecily Keppel, Department of Mechanical and Aerospace Engineering (defended 2016)
Manuel Gómez-González, Department of Mechanical and Aerospace Engineering (defended 2015)

At the University of Illinois at Urbana-Champaign:

Cheng Wang, Department of Mechanical Science and Engineering (defended 2013)
Myungeun Suk, Department of Mechanical Science and Engineering (defended 2013)
Reetesh Ranjan, Department of Mechanical Science and Engineering (defended 2012)
Eakkachai Pengwang, Department of Mechanical Science and Engineering (defended 2011)
Adam M. Willis, Department of Mechanical Science and Engineering (defended 2011)
Amir H. G. Isfahani, Department of Mechanical Science and Engineering (defended 2011)
Andrew J. Dorgan, Department of Aerospace Engineering (defended 2009)

At other institutions:

Nicolas Desreumaux, ESPCI, Paris, France (defended 2015) (rapporteur)
Nawal Quennouz, ESPCI, Paris, France (defended 2013) (rapporteur)

IMPROVEMENT ACTIVITIES

ASEE National Effective Teaching Institute Workshop (NETI-1B), Tampa, FL, January 4–6, 2013.
NSF Short Course on Mechanics of Soft Materials, Northwestern University, Evanston, IL, May 10–12, 2010.
NSF CAREER Proposal Writing Workshop, Georgia Institute of Technology, Atlanta, GA, March 25–26, 2010.

CURRENT FUNDING

National Science Foundation Division of Mathematical Sciences (DMS-1463965), Co-I (with M. J. Shelley, L. Reistroph and J. Zhang, Courant Institute) “Collaborative Research: Understanding and controlling active fluids through modeling, simulation, and experiment,” 2015 – 2018, \$187,500.

National Science Foundation Division of Engineering CAREER Award (CBET-1150590), PI, “Electrokinetic transport of fluid, particles, and macromolecules through nanochannels and nanopores,” 2012 – 2017, \$407,752.

COMPLETED FUNDING

American Chemical Society Petroleum Research Fund (ACS PRF #53240-ND9), PI, “Nonlinear electrohydrodynamics of emulsions in strong electric fields,” 2013 – 2015, \$100,000.

National Science Foundation Division of Engineering (CBET-1440106), PI, “Travel support for students and young researchers to attend ‘Flowing Soft Matter: Bridging the Gap Between Statistical Physics and Fluid Mechanics’ in Udine, Italy”, 2014, \$20,000.

Projet International de Collaboration Scientifique, CNRS-UIUC, Co-I (with E. Guazzelli, L. Bergougnoux and M. Nicolas, CNRS Marseille), “Experimental and numerical study of finite-inertia effects in sedimenting suspensions,” 2011 – 2013, \$20,000.

University of Illinois Research Board, PI, “A novel computational model for short semiflexible polymers under strong confinement,” 2011 – 2013, \$15,320.

National Science Foundation Division of Mathematical Sciences (DMS-0920931-ARRA), Co-I (with M. J. Shelley, Courant Institute), “Collaborative Research: The analysis and simulation of biologically active suspensions,” 2009 – 2012, \$290,403.

Lawrence Livermore National Laboratory Subcontract, Department of Energy (DOE-B583843), PI, “Model development for electrophoretic deposition process,” 2009 – 2013, \$171,000.

Center for Compact and Efficient Fluid Power, A National Science Foundation Engineering Research Center, PI, “Nanoscale additives for pump performance: a computational study of carbon nanotube rheology,” 2010 – 2011, \$25,000.

Arnold O. Beckman Award, University of Illinois Research Board, PI, “Electrochemical transport and diffuse charge dynamics in nanoscale devices,” 2010 – 2011, \$21,268.