Saverio E. Spagnolie

Contact Information

University of Wisconsin-Madison
Department of Mathematics
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Phone: 608-262-3852

Research Areas Fluid Mechanics, Soft Matter, Biophysics, Applied Mathematics, Numerical Methods.

Academic Employment

Professor, Department of Mathematics, University of Wisconsin-Madison	2022-
Courtesy appointment, Department of Chemical & Biological Engineering	2016-
Associate Professor, Department of Mathematics, University of Wisconsin-Madison	2018-2022
Assistant Professor, Department of Mathematics, University of Wisconsin-Madison	2012-2018
Postdoctoral Associate, School of Engineering, Brown University	2011-2012
Postdoctoral Associate, Department of Mechanical/Aerospace Engineering University of California, San Diego	2008-2011

Education

Ph.D., Mathematics, Courant Institute, New York University	2004-2008
M.S., Mathematics, Courant Institute, New York University	2002-2004
B.S., Applied Mathematics, University of Colorado, Boulder	1998-2002

Other Employment

Visiting scientist, Flatiron Institute, Center for Computational Biology	2018-2019
Research assistant, Credit Modeling and Corporate Bond Strategy, Citigroup, NY	2006

Edited volume ***Complex Fluids in Biological Systems***, S.E. Spagnolie (Ed.), Springer Biological and Medical Physics / Biological Engineering Series, Springer, 2015.

Book chapters

Introduction to complex fluids
A. Morozov and S.E. Spagnolie, *Complex Fluids in Biological Systems*, Springer, pp. 3–51, 2015.

Research Publications

Submitted

49. **Geometric dependence of curvature-induced rigidity**
H. Mao, T.G.J. Chandler, M. Han and S.E. Spagnolie.

48. **Arrested development and traveling waves of active suspensions in nematic liquid crystals**
J. Li, L. Ohm, and S.E. Spagnolie.

2024

47. **Active nematic response to a deformable body or boundary: elastic deformations and anchoring-induced flow**
T.G.J. Chandler and S.E. Spagnolie *Phys. Rev. Fluids* (to appear, 2024).

46. **The hydrodynamics of marbling art**
Y. Sun, J.W.M. Bush, S.E. Spagnolie, and C. H. Rycroft *Phys. Rev. Fluids* (to appear, 2024).

45. **Rigid and deformable bodies in nematic liquid crystals (Review)**
T.G.J. Chandler and S.E. Spagnolie, *Phys. Rev. Fluids* (to appear, 2024).

44. **Exact and approximate solutions for elastic interactions in a nematic liquid crystal**
T.G.J. Chandler and S.E. Spagnolie, *SIAM J. Appl. Math.* (to appear, 2024).

43. **Levitation and dynamics of bodies in supersaturated fluids**
S.E. Spagnolie, S. Christianson, and C. Grote, *Nature Commun.*, 2024.
Media engagement: Twitter, 650K views; New Scientist, Sept. 2023;

Sabine Hossenfelder YouTube channel (1M subscribers), Sept. 2023
Sift & Winnow, `https://explore.wisc.edu/siftwinnow-october-2023`, Oct. 2023

2023

42. **A nematic liquid crystal with an immersed body: equilibrium, stress, and paradox**
T.G.J. Chandler and S.E. Spagnolie, *J. Fluid Mech.* **967**, A19 (2023).

41. **Self-buckling and self-writhing of semi-flexible swimmers**
W. Lough, D.B. Weibel and S.E. Spagnolie, *Soft Matter*, **19**, 7349-7357 (2023).

40. **Swimming in complex fluids**
S.E. Spagnolie and P.T. Underhill, *Annu. Rev. Condes. Matter Phys.*, **14**, 381-415 (2023).

2022

39. **Swinging and tumbling of multicomponent vesicles in flow**
P. Gera, D. Salac, and S.E. Spagnolie, *J. Fluid Mech.*, **935**, A39 (2022).

2021

38. **Helical trajectories of swimming cells with a flexible flagellar hook**
Z. Zou, W. Lough, and S.E. Spagnolie, *Phys. Rev. Fluids*, **6**, 103102 (2021).

37. **Protein induced membrane curvature in coarse-grained simulations**
T. Mandal, S. E. Spagnolie, A. Audhya, and Q. Cui, *Biophys. J.*, **120**, 3211-3221 (2021).

2020

36. **Dynamic and reversible shape response of red blood cells in synthetic liquid crystals**
K. Nayani, A.A. Evans, S.E. Spagnolie, and N.L. Abbott, *Proc. Natl. Acad. Sci. USA*, **117**, 26083-26090 (2020).

35. **Shaving and breaking bacterial chains with a viscous flow**
F. Gomand, F. Borges, J. Burgain, W. H. Mitchell, J. Petit, S.E. Spagnolie, and C. Gaiani, *Soft Matter*, **16** 9273-9291 (2020).

34. **Programming van der Waals interactions with complex symmetries into microparticles using liquid crystallinity**
H.A. Fuster, X. Wang, X.-G. Wang, E. Bukusoglu, S.E. Spagnolie, and N.L. Abbott, *Science Advances* **6**, eabb1327 (2020).

33. **Molecular simulation of mechanical properties and membrane activities of the ESCRT-III complexes**
T. Mandal, W. Lough, S. E. Spagnolie, A. Audhya, and Q. Cui, *Biophys. J.*, **118**, 1333-1343 (2020).

2019

32. **Dropping slender-body theory into the mud**
S.E. Spagnolie, *J. Fluid Mech. Focus on Fluids*, **862**, 1-4 (2019).

31. **Swimming with small and large amplitude waves in a confined liquid crystal**
M.S. Krieger, S.E. Spagnolie, and T.R. Powers, *J. Non-Newtonian Fluid Mech.*, **273**, 104185 (2019).

30. **Velocity fluctuations in a dilute suspension of viscous vortex rings**
T. Morrell, S.E. Spagnolie, and J.-L. Thiffeault, *Phys. Rev. Fluids*, **4**, 044501 (2019).

29. **Active matter invasion of a viscous fluid: Unstable sheets and a no-flow theorem**
C.J. Miles, A.A. Evans, M.J. Shelley and S.E. Spagnolie, *Phys. Rev. Lett.*, **222**, 098002 (2019).

2017

28. **A generalized traction integral equation for Stokes flow, with applications to near-wall particle mobility and viscous erosion**,

W.H. Mitchell and S.E. Spagnolie, *J. Comput. Phys.*, **333**, 462-482, 2017.

27. **Microorganism Billiards**
S.E. Spagnolie, C. Wahl, J. Lukasic, and J.L. Thiffeault, *Physica D.*, **341**, 33-44, 2017.

26. **A locally gradient-preserving reinitialization for level set functions**
L. Li, X. Xu, and S.E. Spagnolie, *SIAM J. Sci. Comput.*, **71**, 274-302, 2017.

2016

25. **Straining soft colloids in aqueous nematic liquid crystals**
P.C. Mushenheim, J.S. Pendery, D.B. Weibel, S.E. Spagnolie, and N.L. Abbott, *Proc. Natl. Acad. Sci. USA*, **113**, 5564-5569, 2016.

2015

24. **Bacterial transport of colloids in liquid crystalline environments**
R.R. Trivedi, R. Maeda, N.L. Abbott, S.E. Spagnolie, and D.B. Weibel, *Soft Matter*, **11**, 8404 - 8408, 2015.

23. **Microscale locomotion in a nematic liquid crystal**
M.S. Krieger, S.E. Spagnolie, and T.R. Powers, *Soft Matter*, **11**, 9115 - 9125, 2015.

22. **Sedimentation of spheroidal bodies near walls in viscous fluids: glancing, reversing, tumbling, and sliding**
W.H. Mitchell and S.E. Spagnolie, *J. Fluid Mech.*, **772**, 600-629, 2015.

21. **Geometric capture and escape of a microswimmer colliding with an obstacle**
S.E. Spagnolie, G. Moreno-Flores, D. Bartolo, and E. Lauga, *Soft Matter*, **11**, 3396 - 3411, 2015.

20. **Swimming and pumping by helical waves in viscous and viscoelastic fluids**
L. Li and S.E. Spagnolie, *Phys. Fluids*, **27**, 021902, 2015.

19. **Stability and dynamics of magnetocapillary interactions**
R. Chinomona, J. Lajeunesse, W.H. Mitchell, Y. Yao, and S.E. Spagnolie, *Soft Matter*, **11**, 1828-1838, 2015.

2014

18. **Locomotion and transport in a hexatic liquid crystal**
M.S. Krieger, S.E. Spagnolie, and T.R. Powers, *Phys. Rev. E*, **90**, 052503, 2014.

17. **The instability of a sedimenting suspension of weakly flexible fibres**
H. Manikantan, L. Li, S.E. Spagnolie, and D. Saintillan, *J. Fluid Mech.*, **756**, 935-964, 2014.

16. **Swimming and pumping of rigid helical bodies in viscous fluids**
L. Li and S.E. Spagnolie, *Phys. Fluids*, **26**, 041901, 2014.
Editor's Pick

2013

15. **The sedimentation of flexible filaments**
L. Li, H. Manikantan, D. Saintillan, and S.E. Spagnolie, *J. Fluid Mech.*, **735**, 705-736, 2013.

14. **Locomotion of helical bodies in viscoelastic fluids: Enhanced swimming at large helical amplitudes**
S.E. Spagnolie, B. Liu, and T.R. Powers, *Phys. Rev. Lett.* **111**, 068101, 2013.
Accompanied by a Physics Focus article from Philip Ball.

13. **Elastocapillary self-folding: buckling, wrinkling, and collapse of floating filaments**
A. Evans, S.E. Spagnolie, D. Bartolo, and E. Lauga, *Soft Matter*, **9** (5), 1711-1720, 2013.

2012

12. **Hydrodynamics of self-propulsion near boundaries: Predictions and accuracy of far-field approximations**

S.E. Spagnolie and E. Lauga, *J. Fluid Mech.*, **700**, 105-147, 2012.

11. **The hydrodynamics of the double-wave structure of insect spermatozoa**
O.S. Pak, S.E. Spagnolie, and E. Lauga, *J. R. Soc. Interface*, **9**, 1908-1924, 2012.

2011

10. **Comparative hydrodynamics of bacterial polymorphism**
S.E. Spagnolie and E. Lauga, *Phys. Rev. Lett.*, **106**, 058103, 2011.
Also selected to appear in the *Virtual Journal of Biological Physics Research*, Feb 15, 2011.

9. **A bug on a raft: Recoil locomotion in a viscous fluid**
S. Childress, S.E. Spagnolie, and T. Tokieda, *J. Fluid Mech.*, **669**, 527-556, 2011.

2010

8. **Jet propulsion without inertia**
S.E. Spagnolie and E. Lauga, *Phys. Fluids*, **22**, 081902, 2010.
Featured as "Research Highlights" on the Physics of Fluids web site.

7. **Stokesian jellyfish: Locomotion of a bilayer vesicle**
A. Evans, S.E. Spagnolie, and E. Lauga, *Soft Matter*, **6**, 1737-1747, 2010.
Also selected to appear in the *Virtual Journal of Biological Physics Research*, April 15, 2010.

6. **The optimal elastic flagellum**
S.E. Spagnolie and E. Lauga, *Phys. Fluids*, **22**, 031901, 2010.
Also selected to appear in the *Virtual Journal of Biological Physics Research*, March 15, 2010.

5. **Surprising behaviors in flapping locomotion with passive pitching**
S.E. Spagnolie, L. Moret, M.J. Shelley, and J. Zhang, *Phys. Fluids*, **22**, 041903, 2010.

2009

4. **Rehinging bi-flagellar locomotion in a viscous fluid**
S.E. Spagnolie, *Phys. Rev. E*, **80**, 046323, 2009.

3. **Shape-changing bodies in fluid: Hovering, ratcheting, and bursting**
S.E. Spagnolie and M.J. Shelley, *Phys. Fluids*, **21**, 013103, 2009.
Featured in "Outside JEB", *Journal of Experimental Biology*, 2009.

2006

2. **Periodic sedimentation in a Stokesian fluid**
S. Jung, S.E. Spagnolie, K. Parikh, M. Shelley, and A-K. Tornberg, *Phys. Rev. E*, **74**, 035302, 2006.

2002

1. **Probabilistically optimized airline overbooking strategies**
K. Leder, S.E. Spagnolie, and S. Wild, *UMAP Journal*, **23**, 2002.

General audience

5. **'Dancing' raisins – a simple kitchen experiment reveals how objects can extract energy from their environment and come to life**
S.E. Spagnolie, The Conversation US (2024).

4. **Why a US maths professor created a board game about the medieval Deccan empires**
S.E. Spagnolie, Scroll.in, (2024).

3. **Editorial: Introduction to the 38th Annual Gallery of Fluid Motion (Chicago, IL, USA 2020)**, *Phys. Rev. Fluids*, **6**, 110001 (2021).

2. **Editorial: Special issue on "Complex Fluids in Biological Systems"**
G. J. Elfring and S.E. Spagnolie, *J. Non-Newtonian Fluid Mech.*, **262**, 1-2 (2019).

1. **Using math to solve riddles about microbiology**

S.E. Spagnolie, *Wisconsin State Journal*, May 6, 2017.

Games!

1. **Vijayanagara: The Deccan Empires of Medieval India, 1290-1398**
   S.E. Spagnolie, M. Johnson, C. Graham & A. Matthews, GMT Games, 2024.

Invited Presentations

2025

2nd European Fluid Dynamics Conference Plenary Lecture, Dublin, Ireland, August 2025
Gordon Research Conference (GRC) on Liquid Crystals, Manchester, NH, July 2025

2024

Fluid Mechanics Seminar, Brown University, March 2024
Euromech Colloquium, Imperial College London, May 2024
Fluid Dynamics Seminar, Imperial College London, May 2024

2023

APS-DFD Plenary Lecture, Washington DC, November 2023
Environmental and Biological Fluid Dynamics, U Penn, PA, November 2023
Mathematical Biology Seminar, U Penn, PA, November 2023
Workshop on Frontiers in Active Matter, Penn State, PA, June 2023
Courant Institute of Mathematical Sciences, New York University, New York, NY, April 2023
Department of Physics, University of Chicago, Chicago, IL, April 2023
Workshop on Active Matter in Complex Environments, Aspen School of Physics, January 2023

2022

Industrial and Applied Mathematics seminar, Oxford University, October 2022
World Congress of Biomechanics, Taipei, July 2022
Applied Math Seminar, Mathematics, University of New Mexico, Albuquerque, NM
Mechanics Seminar, Mechanical Engineering, UW-Madison, September 2022

2021

APS March Meeting, Virtual

2020

Colloquium, Mathematics, US Naval Academy, Annapolis, MD
Colloquium, Engineering Sci. and Applied Math., Northwestern University, Evanston, IL
(BIRS-Hangzhou, November, 2020, cancelled)
(BIRS-Banff International Research Station, November, 2020, cancelled)

2019

Frontiers in Applied and Computational Mathematics (FACM), Newark, NJ
Department of Physics, University of Edinburgh, Edinburgh, Scotland
"Mathematics of form in active and inactive media," Isaac Newton Institute, Cambridge, UK
Center for Computational Biology (CCB), Flatiron Institute, New York NY
Department of Applied Mathematics, University of Colorado, Boulder, CO
Department of Mathematics, University of Hawaii at Manoa, Manoa, HI

2018

Department of Physics, New York University, New York, NY
Department of Mathematics, University of Michigan, Ann Arbor, MI
School of Engineering, Brown University, Providence, RI
Department of Applied Mathematics, University of Washington, Seattle, WA
Department of Aerospace & Mechanical Engineering, USC, Los Angeles, CA

AIChE Annual Meeting, Pittsburgh, PA

2017

"Form and deformation in solid and fluid mechanics," Isaac Newton Institute, Cambridge, UK
Recent Advances in Nonlinear Waves, Seattle, WA
Courant Institute of Mathematical Sciences, New York University, New York, NY
Simons Foundation, Flatiron Institute, New York, NY
Batsheva de Rothschild seminar on the Physics of Microfluidics, Sde Boker, Israel
SIAM-CSE (Computational Science and Engineering), Atlanta, GA
Department of Mathematics, University of Utah, Salt Lake City, UT

2016

UW MRSEC BREW on behalf of IRG-3, Madison, WI
GFD Summer Program, Woods Hole Oceanographic Institute, Woods Hole, MA
Department of Mathematics, University of British Columbia, Vancouver, Canada
Department of Mechanical Engineering, University of British Columbia, Vancouver, Canada
Department of Chemical and Biomolecular Engineering, Cornell University, Ithaca, NY
QBio Lecture series, University of Wisconsin-Madison, WI

2015

Department of Mathematics, University of Michigan, Ann Arbor, MI
Frontiers in Applied and Computational Mathematics (FACM), Newark, NJ
Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania, PA
Department of Mathematics, Florida State University, Tallahassee, FL
APS March Meeting 2015, San Antonio, TX

2014

Department of Mathematics, Massachusetts Institute of Technology, Cambridge, MA
Department of Applied Mathematics, Brown University, Providence, RI
Department of Mathematics, University of Minnesota, Minneapolis, MN

2013

Distinguished Lectures in Microbiology, University of Wisconsin-Madison, WI
"Dynamics of Suspensions, Gels, Cells and Tissues," Isaac Newton Institute, Cambridge, UK
Department of Mathematical Sciences, University of Wisconsin-Milwaukee, WI
Department of Mechanical and Aerospace Engineering, University of California San Diego, CA
Department of Mechanical Science and Engineering, University of Illinois, Urbana-Champaign, IL
Department of Mathematics, Tulane University, New Orleans, LA

2012

Mathematical Biosciences Institute (MBI), Columbus, OH
GPS Applied Mathematics Seminar, University of Wisconsin-Madison, WI
SIAM Life Sciences Meeting, San Diego, CA
International Conference on Applied Mathematics (ICAM), City University of Hong Kong, China
Institute of Natural Sciences, Shanghai Jiao Tong University, Shanghai, China (2 parts)
CIRF Seminar, University of California, Santa Barbara, CA
Department of Aero/Mechanical Engineering, University of Southern California, Los Angeles, CA
Department of Applied Mathematics, Naval Postgraduate School, Monterey, CA
Department of Mathematics, University of Wisconsin-Madison, WI
Department of Applied Mathematics, University of California, Merced, CA

2011

Courant Institute of Mathematical Sciences, New York University, New York, NY
Department of Mathematics, Massachusetts Institute of Technology, Cambridge, MA

School of Engineering, Brown University, Providence, RI
Department of Mechanical Engineering, Technion - Israel Institute of Technology, Haifa, Israel
Department of Mathematics, Duke University, Durham, NC
Department of Mathematics, University of North Carolina, Chapel Hill, NC
Department of Structural Engineering, University of California San Diego, CA

2010

Department of Mathematics, University of California, Berkeley, CA
Department of Mathematics, University of Wisconsin, Madison, WI
"Fluid Dynamics: From Theory to Experiment" conference, Montana State U., Bozeman, MT
Institute for Mathematics and its Applications (IMA) workshop, University of Minneapolis, MN

2009

Department of Mechanical Engineering, University of California, Los Angeles, CA
Department of Applied Mathematics, University of Colorado, Boulder, CO
Department of Applied Mathematics, University of California, Davis, CA
Center for Theoretical Biological Physics, University of California San Diego, San Diego, CA

2008

Department of Mechanical and Aerospace Engineering, University of California, La Jolla, CA
Department of Mathematics, New Jersey Institute of Technology, Newark, NJ

Contributed Presentations

2024: Fluids and Elasticity 2024, Arcachon, France
2023: APS March Meeting, Las Vegas, NV
2022: APS March Meeting, Chicago, IL
2021: 74th Meeting of the APS Division of Fluid Dynamics, Phoenix, AZ
2020: 73rd Meeting of the APS Division of Fluid Dynamics, Chicago, IL
2019: 72nd Meeting of the APS Division of Fluid Dynamics, Seattle, WA
2017: 70th Meeting of the APS Division of Fluid Dynamics, Denver, CO
2016: 69th Meeting of the APS Division of Fluid Dynamics, Portland, OR

2015

86th Annual Meeting of the Society of Rheology, Baltimore, MD
68th Meeting of the APS Division of Fluid Dynamics, Boston, MA
Department of Mathematics, University of Wisconsin-Madison, Madison, WI

2014

SIAM Annual Meeting 2014, Chicago, IL
67th Meeting of the APS Division of Fluid Dynamics, San Francisco, CA
APS March Meeting 2014, Denver, CO

2013

85th Annual Meeting of the Society of Rheology, Montréal, Québec, Canada
66th Meeting of the APS Division of Fluid Dynamics, Pittsburgh, PA

2012

Fluids and Elasticity 2012, San Diego, CA
65th Meeting of the APS Division of Fluid Dynamics, San Diego, CA
APS March Meeting 2012, Boston, MA
Aspen Center for Physics - *Growth and Form: Pattern Formation in Biology*, Aspen, CO (poster)

2011

64th Meeting of the APS Division of Fluid Dynamics, Baltimore, MD
New England Workshop - Mechanics of Materials and Struct. (NEW.Mech) MIT, Cambridge, MA
7th International Conference on Bio. Phys. (ICBP), University of California San Diego, CA (poster)
5th Southern California Symp. on Flow Physics, University of Southern California, Los Angeles, CA

2010

63rd Meeting of the APS Division of Fluid Dynamics, Long Beach, CA
"Fluid Dynamics: From Theory to Experiment", Montana State U., Bozeman, MT (poster)
Institute for Mathematics and its Applications workshop, University of Minneapolis, MN (poster)
4th Southern California Symposium on Flow Physics, University of California, Irvine, CA
62nd Meeting of the APS Division of Fluid Dynamics, Minneapolis, MN

2009

3rd Southern California Symposium on Flow Physics, University of California San Diego, CA
61st Meeting of the APS Division of Fluid Dynamics, San Antonio, TX

2005-2008

American Mathematical Society (AMS) Spring Eastern Meeting, New York, NY
61st Meeting of the APS Division of Fluid Dynamics, Salt Lake City, UT (poster)
Citigroup, New York, NY
60th Meeting of the APS Division of Fluid Dynamics, Chicago, IL (video)

Honors/Awards

- 2nd European Fluid Dynamics Conference Plenary Lecture, Dublin, Ireland, August 2025
- APS-DFD Plenary Lecture, Washington DC, November 2023
- Gallery of Fluid Motion Milton Van Dyke award,
  Y. Sun, J.W. Bush, S.E. Spagnolie, & C.H. Rycroft, APS-DFD 2023
- UW-Madison Vilas Associate 2023-2025
- UW-Madison Annual Award for Mentoring Undergraduates in Research,
  Scholarly, and Creative Activities, 2015
- UW-Madison Honored Instructor: 2015, 2017, 2018, 2020
- National Defense Science and Engineering Graduate Fellowship (DoD), 2002-2005

Teaching

University of Wisconsin-Madison

MATH 222, Calculus and Analytic Geometry	Spring '16, '17, '18, '20, '21
MATH 320!, Linear Algebra and Differential Equations (honors)	Fall '15, '16; Spring '16, '17
MATH 322, Applied Mathematical Analysis	Fall '24; Spring '25
MATH 331, Introduction to Probability and Markov Chain Modeling	Spring '13
MATH 375, Topics in Multivariable Calculus and Linear Algebra	Fall '13($\times$2)
MATH 514, Numerical Analysis	Fall '17, '19, '21($\times$2), '22, '23
MATH 703, Methods of Applied Mathematics I (g)	Fall '19, '20
MATH 705, Mathematical Fluid Dynamics (g)	Fall '12, '17, Spring '24
MATH 715, Methods of Computational Mathematics II (g)	Spring '13, '15, '22
MATH 801, Topics in Applied Mathematics: Biological Continuum Mechanics (g)	Spring '14
MATH 801, Topics in Applied Mathematics: Computational Fluid Dynamics (g)	Spring '23
Short course on *Pursuit and Evasion in Biological Fluids* (6 lectures)	Summer '18

(g) - graduate course

Courant Institute, New York University

MATH V63.0121, Calculus I	Fall '05; Spring '06

University of Colorado, Boulder

APPM 2360, Linear Algebra and Differential Equations Summer '03

University of Edinburgh

Short course on *Low-Reynolds-Number Hydrodynamics* (6 lectures) Spring '19

Service

Organization:

- Director, AMEP (Applied Math, Engineering and Physics) Lab at UW-Madison, 2015 - present
- Organizer, "Mechanics of Life - II" workshop, Flatiron Institute, New York, NY, December 2023
- Organizer, "Mechanics of Life" workshop, Flatiron Institute, New York, NY, May 2022
- Organizer, "Workshop: Mathematical Fluids, Materials, and Biology (ShelleyFest)," University of Michigan, Ann Arbor, June 2019
- Organizer, "Workshop on Complex Fluids in Biological Systems," BIRS (Banff International Research Station), July 2018
- Editor, Special issue of JNNFM on "Complex Fluids in Biological Systems," 2019
- Moderator for the arxiv.org physics.flu-dyn category, 2016 - 2018
- Biolocomotion and Fluid-Body Interactions @ SIAM Annual Meeting, 2014 (12 mini-symposia)
- Applied and Computational Math Seminar (UW-Madison, Mathematics), 2012 - present
- APS March 2012 Sorters Meeting
- A Conference in Memory of Thomas Bringley, New York University, March 2009

Committees (UW-Madison):

- Summer chair, 2022-
- MATH 234 committee, 2024
- Ad-hoc salary committee, 2024
- Masters in Applied Mathematics program development committee, 2022-2023
- Administrative Hiring, Summer 2023
- Fundraising committee chair, 2021-2023
- Faculty Associate Hiring, Spring 2021
- Qualifying exam (Computational Math), 2012 - 2016
- Qualifying exam (Applied Math), 2019 - 2021
- Fundraising/Newsletter, 2013, 2020-2021
- Undergraduate advising (Math), 2013 - 2019
- Undergraduate advising (AMEP), 2013 - present
- Math/Botany IT search, 2014
- Library, 2012 - 2013
- Dissertation defenses: Hannah Tuson (Biochem.), Sept. 2012; Qin Li (Math), May 2013; Leland Jefferis (Math), Apr. 2014; Zhennan Zhou (Math), Apr. 2014; Diane Holcomb (Math), Apr. 2014; Beth Skubak Wolf (Math), May 2014; Lei Li (Math), July 2015; Kushal Sinha (Chem. Biol. Eng.), August 2015; Daniel Abras (CBE), Oct. 2015; Yu Sun (Math), Dec. 2015; Xiaoqian Xu (Math), Apr. 2016; Peter Mueller (Math), May 2016; William Mitchell (Math), May 2017; Huanyu Wen (Math), May 2017; Sung-Ning Wang (CBE), June 2017; Anubhav Kushwaha (CBE), June 2017; Frank Nguyen (CBE), July 2018; Xuanrong Guo (CBE), August 2018; Alexandra Kissel (MechE), May 2022, Yijiang Yu (CBE), July 2023

University Committees (UW-Madison):

- AMEP Program Committee, Fall 2016 - present
- UW-Madison Mentoring Undergraduates in Research Award Selection Committee, 2016

Refereeing:

- Bioinspiration & Biomimetics, Biophysical Journal, Computers and Fluids, Current Opinion in Colloid and Interface Science,

European Physical Journal E, IMA Journal of Applied Mathematics,
International Journal of Non-Linear Mechanics, Journal of Computational Physics,
Journal of Fluid Mechanics, Journal of Mathematical Biology,
Journal of Non-Newtonian Fluid Mechanics, Journal of Theoretical Biology, Physical Review E,
Physical Review Letters, Physics Letters A, Physics of Fluids, Physical Review Fluids,
PLoS Computational Biology, PNAS, Proceedings of the Royal Society A,
Quarterly Journal of Mechanics and Applied Mathematics, Scientific Reports,
SIAM Undergraduate Research Online, Soft Matter,
Theoretical and Computational Fluid Dynamics, European Journal of Mechanics B

Educational outreach:

- UW+Purdue Math Club, "Fluids, elasticity, and active particles in the Madison Applied Math Lab," October, 2021.
- "Good Math-ternoon", Franklin Elementary, K-12 outreach, Feb. 2020
- Faculty advisor for Research Experiences for Undergraduates (REU), UW-Madison, Summer 2013 and Summer 2015
- Faculty leader for undergraduate COMAP Mathematical Contest in Modeling at UW-Madison
- Presented at Kauai Community College on "The Mathematics of Love," 2019
- Judge, Kauai Regional Science and Engineering Fair, Seniors and Juniors, 2019
- Participant in UW-Madison outreach to Puerto Rico via Partnerships for Research and Education in Materials (NSF - PREM), Fall 2012-present
- Presented at the UW Research Computing Workshop on Matlab/Mathematica, Sept. 2015
- Presented at the 50th Annual Wisconsin Math/Engineering/Science Talent Search Honors Day on "The Mathematics of Love," May, 2014
- Presented in the UW Microbiology club on "Swimming in viscous fluids," October, 2014
- UW Math Circle (lecture for middle- and high-school students on "Random walks: how gamblers lose and microbes diffuse"), University of Wisconsin-Madison, Fall 2012
- cSplash High School Festival (lecture on "Random Walks and Brownian Motion") New York University, Spring 2008
- High School Honors Institute (lecture on "Interacting Population Dynamics") University of Colorado, Summer 2002
- Lectures in Physical Biology, Shanghai Jiao Tong University, Spring 2012

Grants

Collaborative Research: Sharing the Strain - Synthetic Liquid Crystals as Soft Biomaterials

Role: co-PI (PI Abbott) — Award period: 07/01/21–4/21/23
Source: NSF BMAT-2003819 — Total award amount: $350,000

Workshop: Mathematical Fluids, Materials, and Biology

Role: PI (co-PIs Alben, Thomases, Veerapaneni) — Award period: 06/12/19–06/14/19
Source: NSF DMS-1903035 — Total award amount: $22,500

Multi-Scale Models for Membrane Fission Catalyzed by the Endosomal Sorting Complexes Required for Transport

Role: PI (co-PIs Cui, Audhya) — Award period: 07/01/17–06/31/21
Source: NSF DMS-1661900 — Total award amount: $1,200,000

Configurations and dynamics of deformable particles in a liquid crystal

Role: PI (co-PI Graham) — Award period: 01/2015–06/2017
Source: NSF MRSEC Seed Grant — Total award amount: $193,162

Advising activities

Postdocs:
- Thomas G.J. Chandler (UW-Madison)

- Prerna Gera (UW-Madison)
- Arthur Evans (UW-Madison)

Graduate Students:
- Carsen Grote, (UW-Madison) 2023-
- Bryan Crompton (UW-Madison)
- Lei Li (UW-Madison) [John Nohel Prize in Applied Mathematics, UW-Madison, 2015]
- Hongyi Huang (UW-Madison), 2020-2022
- Jiarui Huang (UW-Madison), 2022-
- Jingyi Li (UW-Madison), 2022-
- Wilson Lough (UW-Madison), 2017-2023
- Hanzhang Mao (UW-Madison) 2023-
- Will Mitchell (UW-Madison) [John Nohel Prize in Applied Mathematics, UW-Madison, 2017]
- Tom Morrell (UW-Madison), 2016-2019
- Sylvia Shi (UW-Madison), 2024-

Visiting scholars:
- Jorge Bailon-Cuba (University of Puerto Rico)
- Faustine Gomand (University of Lorraine, France)

Undergraduate students:
- Sam Christianson (UW-Madison), UW-Madison Hilldale Research Fellowship, 2021
- Rujeko Chinomona (REU student at UW-Madison from Georgia College)
- Chris DuPre (UW-Madison)
- Shiyang Fang (REU student at UW-Madison)
- Mark Han (UW-Madison)
- Weiqiao Han (REU student at UW-Madison from UC Berkeley)
- Janelle Lajeunesse (REU student at UW-Madison)
- Joseph Lukasik (UW-Madison)
- Aaron Raucher (Colorado State University)
- Austyn Simpson (UW-Madison)
- Anne Ulrich (UW-Madison), UW-Madison Hilldale Research Fellowship, 2017
- Colin Wahl (UW-Madison), UW-Madison Hilldale Research Fellowship, 2015
- Yining Wang (UW-Madison)
- Thomas Wilkinson (UW-Madison)
- Max Wrenn (UW-Madison)
- Chi Zhang (UW-Madison)
- Dake Zhang (REU student at UW-Madison)
- Michael Zhao (UW-Madison)
- Yue Zhao (UW-Madison)
- Zonghao Zou (UW-Madison)

High-school students:
- Christopher Xu