

Brato Chakrabarti

Flatiron Institute, Simons Foundation

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Biophysical Modeling
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RESEARCH INTEREST

Soft-matter Physics	Dynamical Systems	Slender Structures
Fluid-structure Interaction	Chaotic Advection	Complex Fluids
Scientific Computing	Biophysics	Hydrodynamic Stability

EDUCATION

Research Fellow

Center for Computational Biology Flatiron Institute, Simons Foundation Mentor: Prof. Michael Shelley	March 2020-Ongoing
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Doctor of Philosophy, Applied Mechanics

Department of Mechanical and Aerospace Engineering Advisor: Prof. David Saintillan GPA: 4.0/4.0	Fall 2015-Fall 2019
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Master of Science, Engineering Mechanics

Biomedical Engineering and Mechanics (BEAM), Virginia Tech Thesis: Catenaries in viscus fluid Advisor: Prof. James Hanna GPA: 4.0/4.0	Fall 2013-Spring 2015
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Bachelor of Engineering, Mechanical Engineering

Jadavpur University, India GPA: 8.9/10	2009-2013
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RESEARCH EXPOSURE

Microscale flow modeling, Saintillan research group

MAE, UC San Diego	Fall 2015-ongoing Graduate research assisatant
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- Bending, buckling and coiling of actin filaments in shear and extensional flow.
- Spontaneous oscillations of filaments and hydrodynamic synchronization.
- Shear dispersion in peristaltic flow and bacterial suspension.
- Mixing, transport and drift due to swimming microorganisms.

Complex suspensions, Anke Lindner Research Group

ESPCI, Paris	Fall 2017-ongoing Visiting student
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- Dynamics of suspension of flexible filaments.
- Buckling and fluctuation dynamics of actin filaments.

Engineering Science and Mechanics, Virginia Tech

Biomedical Engineering and Mechanics (BEAM)	Fall 2013-Spring 2015 Graduate research assistant
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- Dynamics and geometry of towed catenaries in viscous fluids.
- Geometric phase and chaotic advection in journal bearing flow: relation to swimming microorganisms.

PUBLICATIONS (* denotes equal contribution)

1. **Brato Chakrabarti**, and David Saintillan, “Shear-induced dispersion in peristaltic flow”, *Physics of Fluids*, **32** 11302 (2020). **Invited:** “Contributions from Early Career Researchers 2020” and selected as a **featured** article.
2. **Brato Chakrabarti**, Charles Gaillard, and David Saintillan, “Trapping, gliding, vaulting: Transport of semiflexible polymers in periodic post arrays”, *Soft Matter*, **16** 5534 (2020).
3. **Brato Chakrabarti**, Yanan Liu, John Lagrone, Ricardo Cortez, Lisa Fauci, Olivia du Roure, David Saintillan, and Anke Lindner, “Flexible filaments buckle into helicoidal shapes in strong compressional flow”, *Nature Physics*, (2020).
4. **Brato Chakrabarti** and David Saintillan, “Hydrodynamic synchronization of spontaneously beating filaments”, *Physical Review Letters*, **123** 208101 (2019).
5. **Brato Chakrabarti** and David Saintillan, “Spontaneous oscillations, beating patterns and hydrodynamics of active filaments”, *Physical Review Fluids*, **4** 043102 (2019).
6. Roberto Alonso Matilla, **Brato Chakrabarti** and David Saintillan, “Transport and dispersion of active particles in periodic porous media”, *Physical Review Fluids*, **4** 043101 (2019).
7. Yanan Liu*, **Brato Chakrabarti***, David Saintillan, Anke Lindner and Olivia du Roure, “Tumbling, buckling, snaking: Morphological transitions of flexible filaments in shear flow”, *Proceedings of the National Academy of Sciences of the USA*, **115** 9438 (2018).
8. **Brato Chakrabarti** and James Hanna “Catenaries in Viscous Fluid”, *Journal of Fluids and Structure*, **66** 490–516 (2016).

CONFERENCE ARTICLES AND PRESENTATIONS

(Presenter underlined)

- Anke Lindner, Brato Chakrabarti, Yanan Liu, Olivia du Roure and David Saintillan, *The dynamics of flexible Brownian fibers in viscous flows* at The Annual European Rheology Conference, Slovenia, April 8-11, 2019.
- Brato Chakrabarti and David Saintillan, *Spontaneous oscillations and hydrodynamics of active micro-filament* at the 71st Annual Meeting of the APS Division of Fluid Dynamics, November 2018, Atlanta, USA.
- Roberto Alonso Matilla, Brato Chakrabarti and David Saintillan, *Asymptotic transport and dispersion of active particles in periodic porous media* at the 71st Annual Meeting of the APS Division of Fluid Dynamics, November 2018, Atlanta, USA.
- Brato Chakrabarti, Yanan Liu, David Saintillan, Anke Lindner and Olivia du Roure, *The dynamics of flexible and Brownian filaments in viscous flows* at the 71st Annual Meeting of the APS Division of Fluid Dynamics, November 2018, Atlanta, USA.
- Brato Chakrabarti, Yanan Liu, David Saintillan, Anke Lindner and Olivia du Roure, *Buckling and migration of semi-flexible filaments* at the 70th Annual Meeting of the APS Division of Fluid Dynamics, November 2017, Denver, USA.
- David Saintillan and Brato Chakrabarti, *Shear dispersion in peristaltic pumping* at the 70th Annual Meeting of the APS Division of Fluid Dynamics, November 2017, Denver, USA.
- James Hanna and Brato Chakrabarti, *Catenaries in viscous fluid*. 24th ICTAM, Montreal, August 2016.
- Brato Chakrabarti and David Saintillan. *Drift, Mixing and Diffusivity in Stokes Flow*. Presented at the Southern California (SoCal) Fluids X, April 2016, UC Irvine, California, USA.
- Brato Chakrabarti and James Hanna. *Catenaries in viscous fluid*. At the 68th Annual Meeting of the APS Division of Fluid Dynamics, November 2015, Boston, USA.
- Brato Chakrabarti and James Hanna. *Catenaries in Drag*. Presented at the 67th Annual Meeting of the APS Division of Fluid Dynamics, November 2014, San Francisco, USA.

AWARDS AND HONORS

- **Powell Fellow, UCSD** by Jacobs school of Engineering, Fall 2015
- **Bechtel Travel Fellowship** by Virginia Tech, Fall 2014.
- **Pratt Presidential Graduate Fellowship** by Virginia Tech to the incoming outstanding graduate students, 2013-2014.
- **Awarded Gold Medal** for best performance in Fluid Mechanics in Bachelor of Engineering (Mechanical Engineering, Jadavpur University), 2013.
- **Awarded a Summer Research Fellowship** by the Indian Academy of Sciences for undertaking a research project during May–July 2012.
- **National Merit Scholarship** for outstanding performance in school leaving examination, 2009.

REVIEWER FOR ARCHIVED JOURNALS

- Journal of Fluid Mechanics
- Physical Review Fluids
- Journal of Mathematical Fluid Mechanics
- Physical Review E
- Physical Review Letters
- Soft Matter

COMPUTER SKILLS

- **Programming skills:** Fortran 90/95, Python
- **Scientific software:** Matlab, Mathematica, Simulink
- **Documentation/graphics:** L^AT_EX, Beamer, Igor-Pro, Adobe illustrator

TEACHING EXPERIENCE

At Virginia Tech

- Fall 2013: Teaching Assistant, Statics (ESM 2104)
- Spring 2014: Teaching Assistant, Dynamics (ESM 2204)
- Fall 2014: Teaching Assistant, Analytical mechanics (ESM 3214)
- Spring 2015: Teaching Assistant, Vibrations (ESM 3134)

At UCSD

- Winter 2017: Teaching Assistant, Fluid mechanics (MAE 210 A)
- Fall 2018: Teaching Assistant, Introduction to mathematical physics (MAE 105).
- Spring 2019: Teaching Assistant, Hydrodynamic stability (MAE 210 C)

REFERENCES

1. Prof. Michael Shelley
Lilian and George Lyttle Professor of Applied Mathematics
The Courant Institute of Mathematical Sciences
Director, Center for Computational Biology
The Flatiron Institute, Simons Foundation
E-mail: mshelley@simonsfoundation.org Web: <https://math.nyu.edu/faculty/shelley/>
2. Prof. David Saintillan
Professor
Department of Mechanical and Aerospace Engineering, UCSD
E-mail: dsaintillan@eng.ucsd.edu Web: <http://stokeslet.ucsd.edu/>
3. Prof. Anke Lindner
Professor
Department of Physics, University Paris Diderot
E-mail: anke.lindner@espci.fr Web: <https://blog.espci.fr/alindner/>
4. Prof. James Hanna
Associate Professor
Department of Mechanical Engineering, University of Nevada, Reno
E-mail: jhanna@unr.edu Web: <https://cmag.neocities.org/index.html>