

Brato Chakrabarti

Flatiron Institute, Simons Foundation

Research Fellow: Center for Computational Biology

Biophysical Modeling

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RESEARCH INTEREST

Soft-matter Physics

Fluid-structure Interaction

Scientific Computing

Dynamical Systems

Chaotic Advection

Biophysics

Slender Structures

Complex Fluids

Hydrodynamic Stability

EDUCATION

Research Fellow

Center for Computational Biology

Flatiron Institute, Simons Foundation

Mentor: Prof. Michael Shelley

March 2020-Ongoing

Doctor of Philosophy, Applied Mechanics

Department of Mechanical and Aerospace Engineering

Advisor: Prof. David Saintillan

GPA: 4.0/4.0

Fall 2015-Fall 2019

Master of Science, Engineering Mechanics

Biomedical Engineering and Mechanics (BEAM), Virginia Tech

Thesis: Catenaries in visocous fluid

Advisor: Prof. James Hanna

GPA: 4.0/4.0

Fall 2013-Spring 2015

Bachelor of Engineering, Mechanical Engineering

Jadavpur University, India

GPA: 8.9/10

2009-2013

RESEARCH EXPOSURE

Microscale flow modeling, Saintillan research group

MAE, UC San Diego

Fall 2015-ongoing

Graduate research assisatant

- 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

- 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

- 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**, Charles Gaillard, and David Saintillan, “Trapping, gliding, vaulting: Transport of semiflexible polymers in periodic post arrays”, Under review.
2. **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”, to appear in *Nature Physics* (2020).
3. **Brato Chakrabarti** and David Saintillan, “Hydrodynamic synchronization of spontaneously beating filaments”, *Physical Review Letters*, **123** 208101 (2019).
4. **Brato Chakrabarti** and David Saintillan, “Spontaneous oscillations, beating patterns and hydrodynamics of active filaments”, *Physical Review Fluids*, **4** 043102 (2019).
5. Roberto Alonso Matilla, **Brato Chakrabarti** and David Saintillan, “Asymptotic transport and dispersion of active particles in periodic porous media”, *Physical Review Fluids*, **4** 043101 (2019).
6. 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).
7. **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

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. David Saintillan
Professor
Department of Mechanical and Aerospace Engineering, UCSD
E-mail: dsaintillan@eng.ucsd.edu Web: <http://stokeslet.ucsd.edu/>
2. Prof. Anke Lindner
Professor
Department of Physics, University Paris Diderot
E-mail: anke.lindner@espci.fr Web: <https://blog.espci.fr/alindner/>

3. Prof. Juan Lasheras
Professor
Department of Mechanical and Aerospace Engineering, UCSD
E-mail: jlasheras@ucsd.edu Web: <http://maeresearch.ucsd.edu/lasheras/>
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>