Brato Chakrabarti

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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 — March 2020-Ongoing
Flatiron Institute, Simons Foundation
Mentor: Prof. Michael Shelley

Doctor of Philosophy, Applied Mechanics
Department of Mechanical and Aerospace Engineering — Fall 2015-Fall 2019
Advisor: Prof. David Saintillan
GPA: 4.0/4.0

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

Bachelor of Engineering, Mechanical Engineering
Jadavpur University, India — 2009-2013
GPA: 8.9/10

RESEARCH EXPOSURE

Microscale flow modeling, Saintillan research group — Fall 2015-ongoing
MAE, UC San Diego — 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 — Fall 2017-ongoing
ESPCI, Paris — Visiting student

- Dynamics of suspension of flexible filaments.
- Buckling and fluctuation dynamics of actin filaments.

Engineering Science and Mechanics, Virginia Tech — Fall 2013-Spring 2015
Biomedical Engineering and Mechanics (BEAM) — 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**, 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 microfilament* 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.* 24^{th} 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:** LaTeX, 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, Anaytical 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