

Brato Chakrabarti

University of California, San Diego

PhD Student: Applied Mechanics
Mechanical and Aerospace Engineering
Saintillan Research Group
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RESEARCH INTEREST

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

EDUCATION

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

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.

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.

Summer Research Fellow, Indian Academy of Sciences
Indian Institute of Science Education and Research, Kolkata, India
Mentor: Dr. Priyanka Shukla
Summer 2012

- Instability and transition in viscoelastic Poiseuille flow.

PUBLICATIONS

1. **Brato Chakrabarti** and David Saintillan, "Spontaneous oscillations, beating patterns and hydrodynamics of active filaments", *Physical Review Fluids*, **4** 043102 (2019).
2. 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).

3. 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).
4. **Brato Chakrabarti** and James Hanna “Catenaries in Viscous Fluid”, *Journal of Fluids and Structure*, **66** 490–516 (2016).
5. **Brato Chakrabarti** and David Saintillan *Hydrodynamic synchronization of active microfilaments*, under review, 2019.
6. **Brato Chakrabarti** and David Saintillan *Shear dispersion in peristaltic pumping* in preparation.
7. **Brato Chakrabarti**, Yanan Liu, John Lagrone, Ricardo Cortez, Lisa Fauci, David Saintillan, Anke Lindner and Olivia du Roure, *Helical buckling and coiling of filaments in compressional flow*, in preparation.

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*. 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.

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).

REFERENCES

1. Prof. David Saintillan
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2. Prof. Juan Lasheras
Professor
Department of Mechanical and Aerospace Engineering, UCSD
E-mail: jlasheras@ucsd.edu Web: <http://maeresearch.ucsd.edu/lasheras/>
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
Assistant Professor
Department of Biomedical Engineering and Mechanics, Virginia Tech
E-mail: hannaj@vt.edu Web: <http://www2.esm.vt.edu/~hannaj/>