

## Sreeparna Majee (Ph.D.)

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### CONTACT INFORMATION

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### RESEARCH INTERESTS

- Biomedical: Image-based modeling for biofluids and biomechanics; Hemodynamics and vascular transport processes; Cerebrovascular flow; Biomechanics of cardiovascular diseases - stroke, thrombosis, embolisms; Cardiovascular biomedical device design; Biomedical image processing; Magnetic Drug delivery.
- Computational: Computational fluid dynamics and transport processes; Fluid-particle interaction; Multiscale modeling; Computational droplet dynamics; Finite element method; Numerical implicit methods.

### EDUCATION

**Jadavpur university** - Kolkata, India

*Ph.D., Mathematics, January, 2020*

- Dissertation: *Mathematical and computational modeling of blood flow and heat transfer under magnetic environment*
- Advisor: Prof. Gopal Chandra Shit

**IIT(ISM) Dhanbad** - Dhanbad, India

*M.Sc., Mathematics and Computing, June, 2013*

- Thesis: *Magnetohydrodynamics of Couette flow*
- Advisor: Prof. Gouri Shankar Seth

**Lady Brabourne College, University of Calcutta** - Kolkata, India

*B.Sc., Mathematics, June, 2011*

### PROFESSIONAL EXPERIENCE

**Post-doctoral Fellow: Cardiovascular fluid mechanics**

*May, 2022 - Present*

Department of Mechanical Engineering, University of Colorado, Boulder  
Supervisor: Dr. Debanjan Mukherjee

**Research Associate: Droplet dynamics**

*Jan, 2020 - April, 2022*

Department of Mechanical Engineering, Indian Institute of Science, India  
Supervisor: Prof. Saptarshi Basu

### AWARDS & HONORS

1. Young Scientist Award 2019 in the section of Mathematical Sciences including Statistics awarded by Indian Science Congress Association in 106th Indian Science Congress.
2. Best paper presentation award for the paper "Computational modelling of blood flow and heat transfer enhancement in a slowly varying arterial segment under magnetic environment" in International conference on Computational mathematics and statistics, January 24-26, 2017 at Banasthali University, Rajasthan, India.
3. Gold medal (Topper) in M.Sc. Mathematics and Computing-2013.

### JOURNAL ARTICLES

1. **Sreeparna Majee, A. Saha, S. Basu** (2023), Effects of oscillating gas-phase flow on an evaporating multicomponent droplet, *Journal of Fluid Mechanics*, 956:A17.

2. **Sreeparna Majee**, A.R. Chowdhury, R. Pinto, A. Chattopadhyay, A.N. Agharkar, D. Chakraborty, S. Basu (2021), Spatiotemporal evaporating droplet dynamics on fomites enhances long term bacterial pathogenesis, *Communications Biology (Nature)* 4:1173.
3. **Sreeparna Majee**, A. Saha, S. Chaudhuri, D. Chakraborty, S. Basu (2021), Two-dimensional mathematical framework for evaporation dynamics of respiratory droplets, *Physics of Fluids (AIP)* 33(10):103302.
4. **Sreeparna Majee**, S. Maity, G.C. Shit, D.K. Maity (2021), Spatio-temporal evolution of magneto-hydrodynamic blood flow and heat dynamics through a porous medium in a wavy-walled artery, *Computers in Biology and Medicine (Elsevier)* 135:104595.
5. **Sreeparna Majee**, G C Shit (2020), Modeling and Simulation of Blood Flow with Magnetic Nanoparticles as Carrier for Targeted Drug Delivery in the Stenosed Artery, *European Journal of Mechanics/ B Fluids (Elsevier)* 83:42-57.
6. G C Shit, **Sreeparna Majee** (2018), Magnetic field interaction with blood flow and heat transfer through diseased artery having Abdominal Aortic Aneurysm, *European Journal of Mechanics/ B Fluids (Elsevier)* 71:1-14.
7. G C Shit, **Sreeparna Majee** (2018), Computational modelling of MHD blood flow and heat transfer enhancement in a slowly varying arterial segment, *International Journal of Heat and Fluid Flow (Elsevier)* 70:237-246.
8. **Sreeparna Majee**, G C Shit (2017), Numerical investigation of MHD flow of blood and heat transfer in a stenosed arterial segment, *Journal of Magnetism and Magnetic Materials (Elsevier)* 424:137–147.
9. G C Shit, **Sreeparna Majee** (2015), Pulsatile flow of blood and heat transfer with variable viscosity under magnetic and vibration environment, *Journal of Magnetism and Magnetic Materials (Elsevier)* 388:106–115.
10. G C Shit, **Sreeparna Majee** (2013), Hydromagnetic flow over an inclined non-linear stretching sheet with variable viscosity in the presence of thermal radiation and chemical reaction, *Journal of Applied Fluid Mechanics* 7(2):239-247.

#### BOOKCHAPTERS

1. A. Saha, **Sreeparna Majee**, S. Chaudhuri, S. Basu (2022), Ch-11: Evaporation and Precipitation Dynamics of a Respiratory Droplet, *Drying of Complex Fluid Drops: Fundamentals and Applications*, ed David Brutin, Khelil Sefiane, Royal Society of Chemistry, 14:191.
2. GC Shit, **Sreeparna Majee** (2020), Effect of Magnetic Field on Blood Flow, *Safety and Biological Effects in MRI, eMagRes, John Wiley & Sons, Ltd*, 9:133-160.

#### PEER-REVIEWED PROCEEDINGS

1. G C Shit, **Sreeparna Majee** (2017), Computational Modeling of MHD Flow of Blood And Heat Transfer In The Overlapping Stenosed Arterial Segment, *Indian Society for Heat and Mass Transfer, digital library*, DOI: 10.1615/IHMTTC-2017.160, Pages 103-110.

#### ARTICLES IN PREPARATION

1. **Sreeparna Majee**, Akshita Sahni, Ricardo Roopnarinesingh, Aditya Balu, Adarsh Krishnamurthy, Debanjan Mukherjee, Accelerating Lagrangian Flow Analysis Using Distance Fields.
2. **Sreeparna Majee**, Akshita Sahni, Jay Pal, Erin McIntyre, Debanjan Mukherjee, Embolic transport in patients with and without stroke outcome after Left Ventricular Assist Device (LVAD) implantation.

#### ABSTRACTS & PRESENTATIONS

1. **Sreeparna Majee**, Akshita Sahni, Ricardo Roopnarinesingh, Aditya Balu, Adarsh Krishnamurthy, Debanjan Mukherjee, Distance field-based algorithms for particle contact modeling in physiological flows. 17th U.S. National Congress on Computational Mechanics, July,2023.
2. **Sreeparna Majee**, Akshita Sahni, Erin McIntyre, Jay Pal, Debanjan Mukherjee, In Silico Investigation on Stroke Risks from Left Ventricular Assist Device. Summer Biomechanics, Bioengineering and Biotransport Conference, June,2023.

3. **Sreeparna Majee**, Akshita Sahni, Ricardo Roopnarinesingh, Aditya Balu, Adarsh Krishnamurthy, Debanjan Mukherjee, Distance Field Based Approach for Resolving Particle-Wall Interactions for Biomedical Flows. 8th Annual Rocky Mountain Fluid Mechanics Research Symposium 2022, 9 August, Boulder, Colorado, USA.
4. **Sreeparna Majee**, S. Basu, Two-Dimensional evaporation dynamics of a respiratory droplet in context of COVID-19. Droplets 2021, 16-18 August, 2021 organised by Technische Universität Darmstadt, Germany.
5. **Sreeparna Majee**, Modeling and simulation of blood flow with magnetic nanoparticles as carrier for targeted drug delivery in the stenosed artery in The 106th Indian Science Congress, January 3-7, 2019 organised by Indian Science Congress Association, India for Young Scientist Award Programme.
6. **Sreeparna Majee**, Numerical investigation of magnetohydrodynamic blood flow and heat transfer through artery having abdominal aortic in International conference on Applied and Computational Mathematics, November 23-25, 2018 organised by Indian Institute of Technology, Kharagpur, India.
7. **Sreeparna Majee**, Blood flow and heat transfer simulation through artery having abdominal aortic aneurysm under magnetic condition” in International conference in Emerging trends on Applied mathematics and Mechanics, June 18-22, 2018 organised by Jagiellonian University, Krakow, Poland.
8. **Sreeparna Majee**, Magnetohydrodynamic blood flow and heat transfer through diseased artery having abdominal aortic aneurysm” in International conference in conjunction with 14th Biennial conference of Indian Society of Industrial and Applied Mathematics (ISIAM), February 2-4, 2018 organised by Guru Nanak Dev University, Amritsar, India.
9. **Sreeparna Majee**, Computational modelling of blood flow and heat transfer enhancement in a slowly varying arterial segment under magnetic environment” in International conference on Computational mathematics and statistics, January 24-26, 2017 organised by Banasthali University, Rajasthan, India and Universiti Putra Malaysia, Malaysia.
10. **Sreeparna Majee**, Direct Simulation of arterial blood flow and heat transfer in the presence of magnetic field” in the National Conference on Emerging trends in physics of Fluids and Solids, 2016, Department of Mathematics, Jadavpur University.
11. **Sreeparna Majee**, Unsteady MHD flow of blood and heat transfer with variable viscosity under the influence of periodic body acceleration” in the National Conference on Emerging trends in physics of Fluids and Solids, 2015, Department of Mathematics, Jadavpur University.
12. **Sreeparna Majee**, Numerical simulation of blood flow in a straight artery under the influence of magnetic field” at Comsol Multiphysics Conference, Bangalore, 2014.

RESEARCH  
FUNDING

1. Contributed to Grant: Scientific and Useful Profound Research Advancement (SUPRA), Science and Engineering Research Board (SERB), 2022
  - File Number: SPR/2021/000088; Award Amount: Rs. 80,00,000.

RESEARCH  
EXPERIENCE

- **Image-based computational modeling for stroke**
  - Computational modeling of a framework for embolus transport in large arteries for elucidating mechanics and etiology of stroke and embolisms.
  - Coupled multi-scale fluid dynamics models with medical imaging to study cerebrovascular flow for stroke and ischemia.
- **Experimental and computational droplet dynamics**
  - Experimental and mathematical study of bacterial deposition pattern in an evaporating droplet.
  - Computational multiphase modeling of evaporating droplet.
  - Experimental expertise in micro-PIV and fluorescence microscopy.
- **Other experiences**
  - Finite element modeling of blood flow in arteries.
  - Mathematical modeling of bacterial swimming pattern in fluid by chemotaxis.

- Numerical modeling of targeted drug delivery system in blood stream infused with magnetic nanoparticles.
- CFD analysis for fluid flow in complex geometries such as arteries and droplets in terms of flow distribution and temperature distribution.

TEACHING &  
ACADEMIC  
EXPERIENCE

1. Sri Shikshayatan College, University of Calcutta, Guest Lecturer, November 2019- January 2020: Bachelor Degree in Mathematics
2. Jadavpur University, Department of Metallurgical Engineering, Teaching Assistant: Differential Calculus, First semester, 2015-2016 and Differential Calculus, First semester, 2016-2017

PROFESSIONAL  
SERVICE

1. Finance Manager, American Association of Engineers of Indian Origin, CU Boulder Student Chapter.
2. Lifetime member of Indian Science Congress Association. Membership Number: L36324.

SOFTWARE

- Simvascular, Python, Matlab, Fortran, Paraview, Ansys Fluent, C, C++.

REFERENCES

**Prof. Debanjan Mukherjee** *Email:* debanjan@Colorado.Edu  
Assistant Professor, Paul M Rady Department of Mechanical Engineering  
University of Colorado Boulder

**Prof. Saptarshi Basu** *Email:* sbasu@iisc.ac.in  
Professor, Department of Mechanical Engineering  
Indian Institute of Science, Bangalore

**Prof. Abhishek Saha** *Email:* asaha@eng.ucsd.edu  
Assistant Professor, Department of Mechanical and Aerospace Engineering  
University of California San Diego

**Prof. Gopal Chandra Shit** *Email:* gcshit@jadavpuruniversity.in  
Professor, Department of Mathematics  
Jadavpur University, Kolkata