ARNAJA MITRA

⌂ **Website** in **LinkedIn**
✉ amitra13@umd.edu

Employment

Postdoctoral Associate   July, 2024–Present
University of Maryland   College Park, USA
Department of Mathematics
Supervisor: Prof. Abba B. Gumel

Education

PhD in Mathematics   2019–2024
The University of Texas at Dallas   Dallas, USA
GPA: 3.797/4
Supervisors: Prof. Dmitry Rachinskiy, Prof. Wieslaw Krawcewicz, Late Prof. Zalman Balanov
Doctoral Thesis: Equivariant Hopf Bifurcation in Symmetric Systems

M.Sc. in Mathematics   2016–2018
Savitribai Phule Pune University   Pune, India
GPA: 9.9/10 (University Gold Medalist)

B.Sc. (Hons.) in Mathematics   2013–2016
The University of Burdwan   Burdwan, India
GPA: 83.5% (3rd position in the entire University)

Research Interests

✎ Mathematical Biology (Infectious Disease), Bifurcation Theory, Applied Dynamical Systems, Mathematical Modeling

Publications

Thesis: Equivariant Hopf Bifurcation in Symmetric Systems

My thesis primarily focuses on the equivariant degree theory and its application in symmetric dynamical systems, both with and without memory. When traditional Singularity theory methods encounter challenges or fail (due to issues with smoothness or genericity), methods from equivariant degree theory can address these problems.

Hopf Bifurcation of Relative Periodic Solution in Systems of Symmetrically Coupled   Summer 2023–Present
Oscillators (In progress)

Consider a system of coupling n-identical electromechanical oscillators (motors) to a rotating inertial disk via elastic mechanical connections.

Equivariant Global Hopf Bifurcation in Abstract Nonlinear Parabolic Equations   Fall 2021–Summer 2023
✎ **Authors: Arnaja Mitra**, Zalman Balanov, Wieslaw Krawcewicz, Dmitry Rachinskiy (Submitted to the Journal of Differential Equations and is under review) ☞(arXiv)

We developed an equivariant degree-based method for studying symmetric global Hopf bifurcation problems in a parabolic system.

Additional Projects

Optimizing NLP Embedding Techniques for Embedded Systems   August 7, 2023–April, 2024
✎ **Authors:** Karolyn Babalola, Arnaja Mitra, and Jing Qin (AWM Springer series, under review)
Women in Data Science and Mathematics (WiSDM 2023) at Institute for Pure and Applied Mathematics (IPAM)

Oscillatory Instabilities in Frictional Granular Matter   Fall 2020
✎ **Mentor:** Prof. Dmitry Rachinskiy (Class project)

Selected Honors and Awards

🏆 AMS Graduate Student Travel Grant for 2024 JMM — 2023
🏆 Travel Grant for the AWM Research Symposium 2023 (NSF DMS 2113506) — 2023
🏆 NSM Conference Travel Award — 2023
🏆 Travel Award for the 10th International Congress on Industrial and Applied Mathematics (SIAM and NSF DMS 2233032) — 2023
🏆 Julia Williams Van Ness Merit Scholarship — 2022
🏆 Early-career AMS-NSF-Simons-ICM Travel Grant (Including Kovalevskaya Grant) (Offered) — 2022
🏆 Mei Lein Fellowship — 2021
🏆 The Lokmanya Tilak (Mathematics) Prize — 2020
🏆 The Indian Mathematical Conference Poona, Golden Jubilee Prize — 2020
🏆 The Prof. M.K. Agarwal M.A/M.Sc. Mathematics Prize — 2020
🏆 Wrangler Paranjape Mathematics Prize — 2020
🏆 Late Principal Ranglar Gopalkrishna Laxman Chandratraya Gold Medal — 2020
🏆 Late Shri Damodar Ganesh Ramadasi Gold Medal — 2020
🏆 Pandit G.M. Joshi Memorial Gold Medal — 2020
🏆 Rani Katyayani Memorial Prize and Medal — 2019
🏆 Innovation in science Pursuit for Inspired Research Scholarship (Department of Science and Technology, India) — 2013–2018

Posters and Talks

🔖 2024 **Joint Mathematics Meetings** (Talk) — January 5, 2024
San Francisco, CA

🔖 **AWM Pittsburgh Chapter Seminar** (Invited talk, virtual) — November 10, 2023
University of Pittsburgh

🔖 **AWM Research Symposium (**2023**)** (Poster) — September 30–October 2, 2023
Clark Atlanta University

🔖 **SIAM Student Chapter Talk** (Invited talk, virtual) — September 13, 2023
Suny University at Buffalo

🔖 10th **International Congress on Industrial and Applied Mathematics** (Poster) — August 20–25, 2023
Waseda University

🔖 **Nonlinear Analysis Graduate Students' Summer** 2023 **Seminar Series** (Talk) — May 22, 2023
The University of Texas at Dallas

🔖 **Mathematics Graduate Students Workshop** (Talk) — December 2021, 2023
The University of Texas at Dallas

Conferences and Workshops Attended

🔖 **AMS MRC** 2024 (Received Travel Grand) — June 30–July 6, 2024
Beaver Hollow Conference Center, NY, USA

🔖 **AWM Research Symposium (**2023**)** (Received Travel Grand) — September 30–October 2, 2023
Clark Atlanta University, Atlanta, USA

🔖 10th **International Congress on Industrial and Applied Mathematics (ICIAM** 2023**)** (Received Travel Grand) — August 20–25, 2023
Waseda University, Tokyo, Japan

🔖 **Research Collaboration Workshop, "Women in Data Science and Mathematics (WiSDM)"** (Received Travel Grand) — August 7–11, 2023
Institute for Pure Applied Mathematics (IPAM), An NSF Math Institute, University of California, Los Angeles, USA

🔖 **Nonlinear Analysis Graduate Students' Summer** 2023 **Seminar Series** — May 22–June 19, 2023
The University of Texas at Dallas, Dallas, USA

Conferences and Workshops Attended (contd..)

Texas Women in Math Symposium 2023 **(TWIMS** 2023**)** (Received Travel Grant)   March 4–5, 2023
The University of Texas at Austin, Austin, USA

The International Congress of Mathematicians 2022 **(ICM** 2022**)** (Virtual) (Offered Travel Grand)   July 6–14, 2022
International Mathematical Union

Special Metrics in Complex Geometry   May 16–20, 2022
The University of Texas at Dallas, Dallas, USA

Celebration for Women in Mathematics (Virtual)   May 12, 2022
Mathematical Science Research Institute

International Workshop on Applications of Geometric Methods of Functional Analysis   May 3–5, 2022
The University of Texas at Dallas, Dallas, USA

Teaching Experience

📁 **Instructor: University of Maryland**   (Upcoming) Fall 2024
🪄 Differential Equations for Scientists and Engineers

📁 **Teaching Assistant: The University of Texas at Dallas**   August 2019–May, 2024
🪄 Applied Calculus 1 (MATH 1325), Calculus 2 (MATH 2419), Calculus of Several Variable (MATH 2415), College Algebra (MATH 1314), Differential Geometry (MATH 3380), Differential Equations (MATH 2420), Discrete Mathematics and Combinatorics (MATH 3315), Functional Analysis (MATH 6302), Integral Calculus (MATH 2414), Linear Algebra (MATH 2415), Nonlinear Analysis 1 (MATH 6325), Precalculus (MATH 2415), Real Analysis (MATH 6301), Stochastic Dynamic Programming (MATH 7318), Topology (MATH 4341), Trigonometry (MATH 1316)

Service Activities

JMM 2024 poster reviewers (Judge)   January 5, 2024
🍃 **The University of Texas at Dallas**
"Graduate Writing Group" for Fall 2023 (Leadership)   September 16–October 21, 2023
Summer Platform for Undergraduate Research (SPUR) (Judge)   July 28, 2023
Nonlinear Analysis Graduate Students' Summer 2023 Seminar Series (Organizer)   May 22–June 19, 2023
Sommiloni of Bengali Students (Committee Chair)   November 2022–Present
Women in STEAM Living Learning Community (Leadership)   October 2022–Present
Special Metrics in Complex Geometry (Co-organizer)   May 16–20, 2022

Professional Affiliation

American Mathematical Society   2021–Present
Association for Women in Mathematics   2021–Present
Society for Industrial and Applied Mathematics   2021–Present
Women in STEAM, Living Learning Community **(The University of Texas at Dallas)**   2022–May, 2024

Selected Courses

📕 Differential Equations and Dynamical Systems, Applied Dynamical Systems, Stability and Bifurcation Switch Systems, Nonlinear Analysis, Functional Analysis, Numerical Analysis, Differential Equations, Partial Differential Equations

📕 Differential Calculus, Integral Calculus, Integral Equations and Transforms, Advanced Calculus, Boundary Value Problem, Mathematical Probability and Statics, Computer Fundamentals, Stochastic Dynamic Programming

📕 Algebra, Linear Algebra, Analytic Geometry and Vector Analysis, Differential Geometry, Complex Analysis, Real Analysis, Tensor Calculus, Combinatorics, Graph Theory, Lattice Theory, Linear Programming and Game Theory

Additional Degree and Certification Courses

- 📖 **The University of Texas at Dallas:** Graduate Teaching Certification Course 👉(Link)
- 📖 **The University of Texas at Dallas:** Master of science in Mathematics 👉(Link)
- 📖 **Coursera:** Introduction to Programming with Matlab 👉(Link)

Additional Degree and Certification Courses (contd..)

- 📖 **Udemy:** Python for Data Science and Machine Learning Bootcamp (In progress)
- 📖 **Udemy:** The Complete Python Pro Bootcamp for 2024 (In progress)

Skills

- 💻 **Programming Languages:** Mathematica, Matlab, R, Python, Pytorch, Numpy, Pandas, Scikit learn, HUggingface
- 💻 **Miscellaneous:** Gap, LaTeX