ARNAJA MITRA

PhD Student of Mathematics

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Education

August 2019 - Present
- **PhD in Mathematics**
  The University of Texas at Dallas
  Richardson, Texas, USA
  GPA : 3.797/4

May 2016 - April 2018
- **M.Sc in Mathematics**
  Savitribai Phule Pune University (Formerly Known: The University of Pune)
  Pune, Maharashtra, India
  GPA : 9.9/10

June 2013 - April 2016
- **B.Sc three years Honours Degree in Mathematics**
  The University of Burdwan, Hooghly Mohsin College
  Chinsurah, Hooghly, West Bengal, India
  GPA : 83.5%

PhD Thesis Topic

- **Hopf Bifurcation in Symmetric Systems without and with Hysteresis**
  Supervised by the late Prof. Zalman Balanov (2020-June 2022) and currently supervising by Prof. Dmitry Rachinskiy (2020-Present) and by Prof. Wieslaw Krawcewicz (June 2022-Present).

Research Interests

- Applied Mathematical Modeling
- Bifurcation Problems
- Dynamical Systems
- Neural Networks
- Nonlinear Analysis

Projects

- **Optimizing NLP Embedding for Embedded Systems**
  Mentor: Karolyn Babalola
  Women in Data Science and Mathematics (WiSDM 2023**) at Institute for Pure and Applied Mathematics (IPAM)** (August 7, 2023 - Present)

- **Electromechanical Systems with Plastic Hysteresis**
  Mentors: Dmitry Rachinskiy, Wieslaw Krawcewicz
  The University of Texas at Dallas (Summer 2023 - Present)
  Consider a system of coupling n-identical electromechanical oscillators (motors) to a rotating inertial disk via elastic mechanical connections. Also assume the plasticity effect in the inertial disk (more precisely, consider the Prandtl-Ishlinskii operator into the equation of motion), and investigating the existence of branches of relative periodic solutions and their symmetries.

Projects (continued)

- **Equivariant Global Hopf Bifurcation in Abstract Nonlinear Parabolic Equations**
  Authors: Zalman Balanov, Wieslaw Krawcewicz, Arnaja Mitra, Dmitry Rachinskiy
  The University of Texas at Dallas (Fall 2021 - Summer 2023)
  We developed an equivariant degree based methods for equations in abstract Hilbert spaces allowing to study the symmetric Hopf bifurcation in systems of both FDEs and PDEs without typical smoothness and genericity restrictions of the classical methods. Many problems in population dynamics, neural networks, fluid dynamics, solid mechanics, elasticity, chemistry, electrical engineering, etc., lead to studying the Hopf bifurcation in networks of identical oscillators coupled symmetrically or in systems of PDEs defined on symmetric domains (**Submitted to the Journal of Differential Equations and it is currently under review**).

- **Oscillatory Instabilities In Frictional Granular Matter** (Class project)
  Mentored: Dmitry Rachinskiy
  The University of Texas at Dallas (Fall 2020)
  Obtained a result which provided a clear mechanism for the self amplification of small perturbations, it was relevant to the physics of earthquakes.

Employment History

August 2019 - Present
- **Teaching Assistant:** The University of Texas at Dallas, Texas, USA.
  - Applied Calculus 1 (MATH 1325), Teaching (Summer 2020)
  - Calculus 2 (MATH 2419), Teaching (Fall 2022)
  - Calculus of Several Variable (MATH 2415), Teaching (Fall 2019)
  - College Algebra (MATH 1314), Grading (Fall 2020, Fall 2021)
  - Differential Geometry (MATH 3380), Grading (Spring 2023)
  - Differential Equations (MATH 2420), Teaching (Fall 2021, Spring 2022)
  - Discrete Mathematics and Combinatorics (MATH 3315), Grading (Spring 2023)
  - Integral Calculus (MATH 2414), Teaching (Spring 2020)
  - Linear Algebra (MATH 2415), Teaching (Fall 2020, Spring 2021)
  - Nonlinear Analysis 1 (MATH 6325), Grading (Fall 2022)
  - Precalculus (MATH 2415), Grading (Fall 2019)
  - Real Analysis (MATH 6301), Grading (Fall 2022, Fall 2023)
  - Topology (MATH 4341), Grading (Fall 2023)
  - Trigonometry (MATH 1316), Grading (Fall 2020)

May 2019 - July 2019
- **Math Lecturer:** Hooghly Mohsin College, West Bengal, India.
  - Graph Theory

June 2018 - July 2019
- **Private Tutor:** Tutored math for undergrad STEM students, total 18 students.

Honors and Awards

- **PhD**

Travel Grant for the AWM Research Symposium 2023 (Jul 2023)

NSM Conference Travel Award (Jun 2023)

Student Travel Award for the 10^{th} International Congress on Industrial and Applied Mathematics (ICIAM 2023) (Jun 2023)

Julia Williams Van Ness Merit Scholarship (Jul 2022)

Early-career AMS-NSF-Simons-ICM Travel Grant (Cancelled due to circumstances reason) (Jan 2022)

Mei Lein Fellowship (May 2021)

Honors and Awards (continued)

- **M.Sc**
  Ranked 1^{st} across the Savitribai Phule Pune University and received three gold medals and other prizes.
  - The Lokmanya Tilak (Mathematics) Prize (Aug 2020)
  - The Indian Mathematical Conference Poona, Golden Jubilee Prize (Aug 2020)
  - The Prof. M.K.Agarwal M.A/M.Sc. Mathematics Prize (Aug 2020)
  - Wrangler Paranjape Mathematics Prize (Aug 2020)
  - Late Principal Ranglar Gopalkrishna Laxman Chandratraya Gold Medal (Jan 2020)
  - Late Shri Damodar Ganesh Ramadasi Gold Medal (Jan 2020)
  - Pandit G.M. Joshi Memorial Gold Medal (Jan 2020)
- **B.Sc**
  Ranked 1^{st} in the Hooghly Mohsin College and 3^{rd} across the University of Burdwan.
  - Rani Katyayani Memorial Prize and Medal (Sep 2019)
- **Innovation in science Pursuit for Inspired Research Scholarship**
  Department of Science and Technology, India
  Received for five consecutive years from B.Sc to M.Sc (2013-2018)

Research Talk

November 10, 2023 — **AWM Pittsburgh Chapter Seminar (Invited, Virtual-Scheduled)**
University of Pittsburgh

September 13, 2023 — **SIAM Student Chapter Talk (Invited, Virtual-Scheduled)**
Suny University at Buffalo

May 22, 2023 — **Nonlinear Analysis Graduate Students' Summer** 2023 **Seminar Series**
The University of Texas at Dallas
Organized by Myself and prof. Wieslaw Krawcewicz

December 20, 2021 — **Mathematics Graduate Students Workshop**
The University of Texas at Dallas
Organized by prof. Oleg Makarenkov

Conferences and Workshops Attended

August 20 – 25, 2023 — 10^{th} **International Congress on Industrial and Applied Mathematics (ICIAM** 2023**)**
Waseda University, Tokyo, Japan

August 7 – 11, 2023 — **Research Collaboration Workshop, "Women in Data Science and Mathematics (WiSDM)"**
Institute for Pure Applied Mathematics (IPAM), An NSF Math Institute at UCLA

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

July 6 – 14, 2022 — **The International Congress of Mathematicians** 2022 **(ICM** 2022**)**
International Mathematical Union
A honor to get a chance as an early career mathematician to join ICM 2022 in person but held virtually due to circumstances.

Conferences and Workshops Attended (continued)

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

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

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

Service Activities

July 28, 2023 • **Summer Platform for Undergraduate Research (SPUR) Judge**
The University of Texas at Dallas
As a judge, I evaluated my assigned undergraduate student posters and listened to their presentations, assessing their communication skills, topic knowledge, and ability to explain their research

November 2022-Present • **Sommiloni of Bengali Students** (Committee Chair)
The University of Texas at Dallas
Organize bengali events and promote bengali culture

October 2022-Present • **Women in STEAM Living Learning Community** (Leadership)
The University of Texas at Dallas
Assisting events on STEAM, discussions, and conversions of roles and contributions of women in STEAM

May 16 – 20, 2022 • **Special Metrics in Complex Geometry** (Volunteered)
The University of Texas at Dallas
Sponsored by the National Science Foundation and the University of Texas at Dallas, organized by prof. Ronan Conlon, prof. Hans-Joachim Hein, prof. Song Sun, prof. Gábor Székelyhidi

May 3 – 5, 2022 • **International Workshop on Applications of Geometric Methods of Functional Analysis** (Volunteered)
The University of Texas at Dallas
In cooperation with Association for Women in Mathematics and sponsored by the National Science Foundation and the University of Texas at Dallas, organized by Late prof. Zalman Balanov, prof. Lorena Bociu, prof. Katy Craig, prof. Akif Ibragimov, prof. Mihaela Ignatova, prof. Alexander Krasnosel'skii, prof. Wieslaw Krawcewicz, prof. Oleg Makarenkov, prof. Dmitriy Rachinskiy

November 6, 2021 • **Invited to Assist NSM Dean's Thanksgiving Alumni event**
The University of Texas at Dallas
Organized by Natural Science and Mathematics Dean's Office

May 2021 • **UTD/UTSW C19VacVolunteer**
The University of Texas at Dallas
Davidson-Gundy Alumni Center

Professional Affiliation

2021 - Present • **American Mathematical Society**
2021 - Present • **Association for Women in Mathematics**

Professional Affiliation (continued)

2022 - Present
- **Society for Industrial and Applied Mathematics**
- **Women in STEAM, Living Learning Community**

The University of Texas at Dallas

Courses During B.Sc, M.Sc, PhD

- **Completed**
  - Advanced Calculus, Algebra, Analytic Geometry and Vector Analysis, Applied Dynamical Systems
  - Boundary Value Problem, Combinatorics, Complex Analysis, Computer Fundamentals (Fortran 77)
  - Differential Calculus, Differential Equations, Differential Equations and Dynamical Systems, Differential Geometry, Dynamics of a particle and of a Rigid body
  - Field Theory, Functional Analysis, Graph Theory, Hydrostatics
  - Integral Calculus, Integral Equations and Transforms, Lattice Theory, Linear Algebra, Linear Programming and Game Theory
  - Mathematical Probability and Statics, Measure and Integration, Metric Spaces, Nonlinear Analysis, Numerical Analysis
  - Partial Differential Equations, Real Analysis, Ring Theory
  - Stability and Bifurcation Switch Systems, Stochastic Dynamic Programming, Tensor Caculus, Topological and Algebraic Methods, Topology

Additional Certification Courses

- **Completed**
  - **Introduction to Programming with Matlab**

  Issued by Coursera
- **Attending**
  - **The Complete Python Pro Bootcamp for** 2023

  By Udemy
  - **Python for Data Science and Machine Learning Bootcamp**

  By Udemy

Skills

- **Languages**
  - English (Professional)
  - Bengali (Native)
- **Programming Languages**
  - Mathematica
  - Matlab
  - Python
  - R
- **Miscellaneous**
  - Gap
  - LaTeX
  - Ms-office
  - Ms-PowerPoint

References

- **Reference** 1
  Name: Dmitry Rachinskiy
  Professor - Mathematical Sciences
  FO 2.602D, The University of Texas at Dallas
  dmitry.rachinskiy@utdallas.edu
- **Reference** 2
  Name: Wieslaw Krawcewic
  Professor - Mathematical Sciences
  FO 2.602F, The University of Texas at Dallas
  wieslaw@utdallas.edu
- **Reference** 3
  Name: Oleg Makarenkov
  Associate Professor - Mathematical Sciences
  FO 2.610 C, The University of Texas at Dallas
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- **Reference** 4
  Name: Alain Bensoussan
  Lars Magnus Ericsson Chair, Professor - Management
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- **Reference** 5
  Name: Ajaya Paudel
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