

Atul Anurag

📍 NJIT ✉ aa2894@njit.edu ☎ +1862-237-1632 🌐 atulanurag.com in atul-anurag

Education

New Jersey Institute of Technology (NJIT), USA	Sept 2019 – July 2025
Ph.D. in Applied Mathematics	(Defended)
Dissertation Advisor: Roy H. Goodman	
National Institute of Technology (NIT), Warangal, India	Aug 2015 – Jun 2017
M.Sc. in Applied Mathematics	
Dissertation Advisor: Poosan Muthu Moopanar	
Ramjas College, University of Delhi, New Delhi	Jul 2012 – Jul 2015
B.Sc. (Honors) in Pure Mathematics	

Experience

- **Research Assistant**, Prof. Roy H. Goodman, Department of Mathematical Sciences, NJIT, Spring 2022 – Present
 - Developed MATLAB algorithms to analyze the global phase space of a three-point vortex problem on a sphere using a novel reduction technique.
 - Designed computational methods for the generalization of leapfrogging orbits of point vortices using AUTO.
 - Developed a new coordinate system to handle cases where the total vortex strength sums to zero, overcoming limitations of conventional approaches.
- **Teaching Assistant and Adjunct Professor**, NJIT, Fall 2019 – Spring 2022
 - Adjunct professor for calculus courses at the Educational Opportunity Program Summer Program at NJIT
 - Led recitations and provided instructional support for Calculus I & II and MATLAB programming courses. The notes for the courses can be found [here](#).
 - Assisted students with problem-solving, conceptual understanding, and computational techniques.
- **Research Co-Mentor**, NJIT, Summer 2023 – Present
 - Supervised and guided undergraduate research students, including E. O’Grady, on mathematical modeling and computational projects.
- **Summer Researcher**, Indraprastha Institute of Information Technology, New Delhi, Summer 2018
 - Advisor: Prof. Ashish Kumar Pandey
 - Applied operator theory to analyze nonlinear PDEs and their mathematical properties.
- **Indian Academy of Sciences Intern**, Tata Institute of Fundamental Research, Center for Applied Mathematics, Bangalore, Summer 2014
 - Advisor: Prof. Kayyunnappara Thomas Joseph
 - Implemented image processing and digital signal processing algorithms based on Laplace transformations.

Publications

- A New Canonical Reduction of Three-Vortex Motion and its Application to Vortex-Dipole Scattering, Atul Anurag, Roy H. Goodman, and Ellison O’ Grady, Physics of Fluids, 36, 067110 (2024) [[Link](#)].
- (Manuscript submitted to Nonlinearity) The global phase plane analysis of the three-vortex interactions, Atul Anurag and Roy H. Goodman (2025) [[Link](#)].
- (In preparation) The four-vortex motion with zero total circulation, Atul Anurag and Roy H. Goodman (2025).

Selected Graduate Coursework

Asymptotic Methods, Optimization Theory, Applied Statistics, Computational Fluid Dynamics, Discrete Mathematics, Functional Analysis, Finite Volume Methods, Topology, Integral and Discrete Transforms, Finite Element Methods, Theoretical Operations Research, Number Theory, etc.

Conference and Seminar Presentations

- (Poster) The Global Phase Plane Analysis of Three Vortex Interactions, Frontiers in Applied & Computational Mathematics, New Jersey Institute of Technology, USA, June (2025)
- (Joint work with *Roy Goodman*) The Phase Space of the Three-Vortex Problem and Its Application to Vortex-Dipole Scattering, SIAM Conference on Applications of Dynamical Systems (DS25), Denver, USA, May (2025)
- (Poster) The Global Phase Plane Analysis of Three Vortex Interactions, Board Day and Dana Knox Student Research Showcase, New Jersey Institute of Technology, USA, April (2025)
- (Poster) Global Phase Plane Analysis of the three-vortex problem, SIAM New York-New Jersey-Pennsylvania Section Conferences (SIAM-NNP), Rochester Institute of Technology, USA, November (2024)
- (Talk) The Phase Space of the Three-Vortex Problem and its Application to Vortex-Dipole Scattering, Faculty and Student Summer Talks, Mathematics, NJIT, June (2024)
- (Talk) The Phase Space of the Three-Vortex Problem, SIAM Conference on Nonlinear Waves and Coherent Structures, Lord Baltimore Hotel, Baltimore, June (2024)
- (Poster) Point Vortex Dipole Scattering, SIAM New York – New Jersey – Pennsylvania (SIAM-NNP), NJIT, October (2023)
- (Talk) Continuation of Periodic Orbits in Symmetric Hamiltonian and Conservative Systems, Faculty and Student Summer Talks, Mathematics, NJIT, July (2023)
- (Problem Solver) Mathematical Problems in Industry Workshop, NJIT, June (2023)
- (Attendee) Second Drexel Waves Workshop, Drexel University, March (2023)
- (Thesis Proposal Defense) Generalization of Leapfrogging Orbits of Point Vortices, NJIT, January (2023)
- (Talk) Walking Droplet Dynamics Research, NJIT, June (2021)

Skills

Programming Languages: Python, MATLAB, Mathematica, Julia, FORTRAN, C++, HTML, R, SQL

Other Software: \LaTeX , AUTO

Languages: Fluent in Hindi, English, and Sanskrit

Awards and Honors

- Indian Institute of Technology, Joint Admission Test for M.Sc. (IIT-JAM)
Secured All India Rank 354 among 15,000 (approx) students, 2015
- Council of Scientific & Industrial Research (CSIR)
Award Junior Research Fellowship and appointment as Assistant Professor
Secured All India Rank 46 among 40,000 (approx) students, 2018
Only top 200 students are fully funded in their PhD program

Leadership and Service

- Student Chapter of SIAM at NJIT, Vice-President, June 2022 – June 2024
- UCAN Executive Committee, Grad executive board member-at-large, June 2024 – May 2025
A Union of Student Workers, Researchers, and Adjunct Instructors
- (Volunteer, Attendee) Frontiers in Applied and Computational Mathematics, NJIT, 2022, 2023
- Class Representative (M.Sc.), Department of Mathematics, NIT, Warangal, India, July 2015 – May 2017

References

Prof. Roy H. Goodman, Mathematical Sciences, NJIT, goodman@njit.edu (dissertation advisor)

Prof. David Shirokoff, Mathematical Sciences, NJIT, david.shirokoff@njit.edu (dissertation committee member)

Prof. Jonathan Jaquette, Mathematical Sciences, NJIT, lushi@njit.edu (dissertation committee member)

Prof. Joseph Zaleski, Mathematical Sciences, NJIT, joseph.zaleski@njit.edu (teaching reference)