

# Atul Anurag

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

## Education

---

<b>New Jersey Institute of Technology (NJIT), USA</b>	Sept 2019 – July 2025
Ph.D. in Applied Mathematics	(Defended)
Dissertation Advisor: Roy H. Goodman	
<b>National Institute of Technology (NIT), Warangal, India</b>	Aug 2015 – Jun 2017
M.Sc. in Applied Mathematics	
Dissertation Advisor: Poosan Muthu Moopanar	
<b>Ramjas College, University of Delhi, New Delhi</b>	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:**  $\text{\LaTeX}$ , 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](mailto:goodman@njit.edu) (dissertation advisor)

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

Prof. Jonathan Jaquette, Mathematical Sciences, NJIT, [jonathan.jaquette@njit.edu](mailto:jonathan.jaquette@njit.edu) (dissertation committee member)

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