Gokul G. Nair

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EMPLOYMENT

Hill Assistant Professor (postdoc) 2024 - present
Department of Mathematics, Rutgers University, NJ, United States
Mentor: Ian Tobasco

EDUCATION

Ph.D. in Applied Mathematics 2018 - 2024
Cornell University, Ithaca, NY, United States
Advisor: Timothy Healey, Department of Mathematics
Thesis Title: Convexity conditions and energy minimization for highly deformable elastic surfaces

Masters in Applied Mathematics 2018-2021
Cornell University, Ithaca, NY, United States
Minors: Mathematics, Theoretical Physics

Bachelor of Science in Physics (First Class with Distinction) 2014 - 2018
Indian Institute of Science, Bangalore, India
Thesis Advisors: Chandan Dasgupta & Sriram Ramaswamy, Department of Physics
Thesis Title: *On the Statistics of Extremes in Self-Driven Particles*

VISITING POSITIONS

Visiting Graduate Student Feb - April 2023
Hausdorff Research Institute for Mathematics,
University of Bonn, Bonn, Germany

Visiting Scholar May - July 2017
Department of Engineering Sciences and Applied Mathematics,
Northwestern University, Evanston, IL, United States

RESEARCH INTERESTS

Calculus of Variations, Nonlinear Elasticity, Applied Analysis, Minimal Surfaces, Complex systems

HONOURS/ AWARDS

Travel award, Society for Industrial and Applied Mathematics (2024)
Awarded to researchers to support travel to SIAM conferences.

Mathematics Instructor Development Certificate, Cornell (2023)
Awarded to students who complete a series of teaching-related activities.

Graduate Student Teaching Award, Math Dept., Cornell (2022)
Awarded annually to 2-4 students in recognition of the importance of teaching.

Cornell Research Travel Grant, Cornell University (2022-23)
Awarded to Ph.D. students to attend conferences at which they are presenting.

Mathematics Teaching Development Fellow, Cornell University (2022)
Organized teaching seminars and supported TA professional development.

First Class with Distinction, Indian Institute of Science (2018)
Equivalent to "summa cum laude" in the Indian honours system.

S.N. Bose Fellowship, Indo-U.S. Science and Technology Forum (2017)
To support Indian undergraduates to pursue research projects in the United States.

KVPY Fellowship, Government of India (2014)
Scholarship encouraging undergraduates to take up research careers in science.

RESEARCH PUBLICATIONS

1. *Energy minimizing configurations for single-director Cosserat shells*, Timothy J. Healey, Gokul G. Nair. Journal of Elasticity (2023) `arXiv:2208.09051`
2. *Nonlinearly elastic maps: Energy minimizing configurations of membranes on prescribed surfaces*, Timothy J. Healey, Gokul G. Nair. Quart. Appl. Math. (2024) `arXiv:2308.02070`
3. *Stationary curves under the Möbius-Plateau energy*, Max Lipton, Gokul G. Nair. arXiv preprint (2023) `arXiv:2208.12678`
4. *Dynamics and synchronization in random networks of coupled phase-oscillators: A graphon approach*, (with Shriya Nagpal, Francesca Parise and Steven Strogatz). (In preparation 2023)
5. *Designing for robustness in electric grids via a general effective resistance measure*, Shriya V. Nagpal, Gokul G. Nair, Francesca Parise, and C. Lindsay Anderson. IEEE TCNS (2022) `arXiv:2201.00929`
6. *Fission-fusion dynamics and group-size-dependent composition in heterogeneous populations*, Gokul G. Nair, Athmanathan Senthilnathan, Srikanth K. Iyer, and Vishwesha Guttal. Physical Review E (2019) `arXiv:1711.06882`

TEACHING EXPERIENCE

At Rutgers:

- Multivariable calculus, Instructor (Fall 2024, Spring 2025)

At Cornell:

- Calculus II, Instructor (Fall 2022)
- Partial Differential Equations, Grader (Spring 2022, Fall 2023)
- Differential Equations for Engineers, TA (Fall 2021)
- Honours Introduction to Analysis I, Grader (Fall 2020)
- Multivariable Calculus, TA (Spring 2020)
- Differential Equations for Engineers, TA (Fall 2019)
- Multivariable calculus for Engineers, TA (Fall 2018 - Spring 2019)

TALKS

- **Brown University ICERM, Geometry of Materials Workshop:** *Scaling law analysis for crystals on curved surfaces lightning talk (2025)*
- **Rutgers University, Applied and Computational Math seminar:** *Large graph limits and synchronization of coupled oscillator networks (2024)*
- **SIAM Conference on Mathematical Aspects of Materials Science:** *Existence theorems and regularity properties for highly deformable elastic plates and shells* (2024) **Invited talk*
- **Cornell University, Applied Math Winter Symposium:** *Mathematical aspects of Origami (general audience talk)* (2023)

- **University of Pisa, Department of Civil and Industrial Engineering seminar:** *Existence theorems for highly deformable elastic surfaces* (2023) **Invited talk*
- **SIAM New York-New Jersey-Pennsylvania Annual Meeting:** *Energy minimizing configurations of highly stretchable elastic surfaces* (2023)
- **Hausdorff Center for Mathematics, Bonn, Workshop on Nonlinear PDEs: Recent Trends in the Analysis of Continuum Mechanics:** *Energy Minimizing Configurations for Single-Director Cosserat Shells* (2023)
- **Cornell University, Applied Dynamics Seminar:** *A graphon approach to synchronization on large random graphs* (2023)
- **Hausdorff Institute, University of Bonn, Workshop on Variational methods for complex phenomena in solids:** *Energy Minimizing Configurations for Single-Director Cosserat Shells* (2023) **Invited talk*
- **Hausdorff Institute, University of Bonn, Work group seminar:** *Convex Integration for the p-Laplace equation* (2023)
- **Cornell University, Analysis Seminar:** *Energy Minimizing Configurations for Highly Deformable Elastic Surfaces* (2022)
- **University of Ulm, Horizons in Nonlinear PDEs Summer School:** *Energy Minimizing Configurations for Highly Deformable Elastic Surfaces* (2022)
- **Cornell University, Applied Dynamics Seminar:** *Schoen and Yau's proof of the Positive Mass theorem* (2021)
- **Cornell University, Applied Math Student Seminar:** *Introduction to Curvature* (2020)
- **Cornell University, Dynamics Seminar:** *Proving the Uniformization theorem using Ricci flow* (2020)
- **Cornell University, Mathematics Teaching Seminar:** *Promoting Creative Reasoning via Good Questions*, with S. Ong (2022)
- **Cornell University, Applied Dynamics Seminar:** *On the Dynamics of Power Grids* (2022)
- **Cornell University, REU program:** *Introduction to Synchronization and the Kuramoto model* (2019)

CONFERENCES/ WORKSHOPS

- ICERM workshop on the geometry of materials (2025)
- SIAM conference on Material Science (2024)
- SIAM New York-New Jersey-Pennsylvania annual meeting, Newark (2023)
- Workshop on Nonlinear PDEs: Recent Trends in the Analysis of Continuum Mechanics, Hausdorff Center for Mathematics, University of Bonn, Germany (2023)
- Workshop on Variational Methods for Complex Phenomena in Solids, Hausdorff Institute for Mathematics, University of Bonn, Germany (2023)
- Mathematics for Complex Materials Trimester Programme, Hausdorff Institute for Mathematics, University of Bonn, Germany (2023)
- Horizons in Nonlinear PDEs Summer School, University of Ulm, Germany (2022)
- Communicating Mathematics Conference, Cornell University (2022)

- STEM Communication Workshop, Alan Alda Center for Communicating Science (2021)

SERVICE

- Co-organizer, Rutgers Applied and Computational math seminar (2024-2025)
- Facilitator, Mathematics TA training program (2020 & 2023)
- President, Cornell SIAM chapter (2021-2022)
- Organizer, Mathematics teaching seminar (Fall 2022)
- Organizer, Applied Mathematics Student Seminar (2020-2022)
- Mentor, Directed Reading Program, Cornell Department of Mathematics (2020-2022)
- Expanding Your Horizons Volunteer, Cornell University (2022)

HUMAN LANGUAGES

- Native proficiency: English, Malayalam
- Fluent: Hindi, Kannada
- Limited proficiency: Tamil, Sanskrit

COMPUTER LANGUAGES

C, C++, Python (Numpy, Scipy, Fenics), Mathematica, LaTeX, HTML, CSS