

# GOKUL G. NAIR

---

Center For Applied Mathematics  
Cornell University, NY  
gn234@cornell.edu

EDUCATION	<b>Ph.D. in Applied Mathematics</b> 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
	<b>Masters in Applied Mathematics</b> 2018-2021 Cornell University, Ithaca, NY, United States Minors: Mathematics, Theoretical Physics
	<b>Bachelor of Science in Physics</b> (First Class with Distinction) 2014 - 2018 Indian Institute of Science, Bangalore, India Thesis Advisors: Chandan Dasgupta & Sriram Ramaswamy, Department of Physics Thesis Title: <i>On the Statistics of Extremes in Self-Driven Particles</i>
VISITING POSITIONS	<b>Visiting Graduate Student</b> Feb - April 2023 Hausdorff Research Institute for Mathematics, University of Bonn, Bonn, Germany
	<b>Visiting Scholar</b> 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	<b>Travel award</b> , Society for Industrial and Applied Mathematics (2024) <i>Awarded to researchers to support travel to SIAM conferences.</i>
	<b>Mathematics Instructor Development Certificate</b> , Cornell (2023) <i>Awarded to students who complete a series of teaching-related activities.</i>
	<b>Graduate Student Teaching Award</b> , Math Dept., Cornell (2022) <i>Awarded annually to 2-4 students in recognition of the importance of teaching.</i>
	<b>Cornell Research Travel Grant</b> , Cornell University (2022-23) <i>Awarded to Ph.D. students to attend conferences at which they are presenting.</i>
	<b>Mathematics Teaching Development Fellow</b> , Cornell University (2022) <i>Organized teaching seminars and supported TA professional development.</i>
	<b>First Class with Distinction</b> , Indian Institute of Science (2018) <i>Equivalent to “summa cum laude” in the Indian honours system.</i>

**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. (Under review, *SIAM Math. Anal.* 2023) [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 Vishwesh Guttal. *Physical Review E* (2019) [arXiv:1711.06882](#)

## TEACHING EXPERIENCE

- 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

- **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

- 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

- 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, L<sup>A</sup>T<sub>E</sub>X, HTML, CSS