Nikhil Manoj

Thiruvananthapuram, Kerala, India

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About me

I am a Ph.D. candidate in Mathematics at IISER Thiruvananthapuram, India, working on numerical methods for partial differential equations, particularly high-resolution finite volume schemes for hyperbolic conservation laws. My current research involves designing and analyzing high-order numerical methods for conservation laws with discontinuous and non-local flux functions. While my primary expertise lies in finite volume methods, I am eager to broaden my knowledge by working on a diverse range of methods and models.

Research Interests

- High-resolution numerical methods for hyperbolic conservation laws
- Non-local conservation laws
- Conservation laws with discontinuous flux
- Convergence analysis of numerical methods
- Discontinuous Galerkin methods

Current position

Position : Ph.D. candidate, School of Mathematics, IISER Thiruvananthapuram
Thesis title : High-Order Numerical Schemes for Conservation Laws with Discontinuous and Non-Local Fluxes
Ph.D. advisor : Dr. Sudarshan Kumar K.
Thesis submission date : 31 May, 2025 (expected)

Publications

1. **Nikhil Manoj**, Veerappa Gowda G. D. and Sudarshan Kumar Kenettinkara. "Convergence of a second-order scheme for non-local conservation laws" *ESAIM: M2AN*, 57 (6) 3439-3481(2023). DOI: 10.1051/m2an/2023080.
2. **Nikhil Manoj**, Veerappa Gowda G. D. and Sudarshan Kumar Kenettinkara. "A positivity preserving second-order scheme for multi-dimensional system of non-local conservation laws" *(preprint, submitted)*, (2024). Available at: 10.48550/arXiv.2412.18475.
3. **Nikhil Manoj** and Sudarshan Kumar Kenettinkara. "Analysis of a MUSCL-type central scheme for conservation laws with discontinuous flux" *(preprint, submitted)*, (2025). Available at: 10.48550/arXiv.2501.04620.

Technical Skills

Programming Languages Python, C++
Visualization Software VisIt, Gnuplot
Programming Software MATLAB
Dev Tools Visual Studio Code, Git

Education

Indian Institute of Science Education and Research (IISER) Thiruvananthapuram — Thiruvananthapuram, India
Ph.D. in Mathematics — *2025 (expected)*

Cochin University of Science and Technology — Kochi, India
M.Sc. in Mathematics (CGPA: 8.43/10.00) — *2020*

St. Berchmans College — Changanassery, India
B.Sc. in Mathematics (CCPA: 9.66/10.00) — *2018*

Central Board of Secondary Education — India
12th grade (Aggregate percentage: 95.4 with A1 grade in all subjects) — *2015*

Central Board of Secondary Education — India
10th grade (CGPA: 10.00/10.00) — *2013*

Workshops and Conferences Attended

- "EQUADIFF-2024" held at Karlstad University, Sweden during 10-14 June, 2024.
- "Finite Volume and Spectral Methods for Hyperbolic Problems" held during 04-15 December 2023 at TIFR-CAM.
- "International Congress on Industrial and Applied Mathematics (ICIAM)-2023" held during 20-25 August, 2023 at Waseda University, Tokyo.
- "Frontier Symposium in Mathematics" April 2022 and February 2023 held at IISER Thiruvananthapuram.
- "Numerical Methods for Partial Differential Equations" conducted by National Center of Mathematics and IISER Thiruvananthapuram, September 2022.
- "The Fourth BRICS Mathematics Conference" December 2021 held at IISER Thiruvananthapuram.
- "Training Program in Mathematics 2017" held during 22 May-17 June 2017 at NISER Bhubaneswar.

Research Talks

- *Convergence of a second-order scheme for non-local traffic flow problems.*
  Contributed talk at International Congress on Industrial and Applied Mathematics (ICIAM)-2023, Waseda University, Tokyo.
- *Convergence of a second-order scheme for non-local conservation laws.*
  Contributed talk at EQUADIFF-2024, Karlstad University, Sweden.

Teaching Experience

- **Tutor**, NCM-Advanced Training in Mathematics Workshop (ATMW) on "Numerical Methods for Partial Differential Equations," held at the Indian Institute of Petroleum and Energy, Visakhapatnam, India, from 16th–27th December 2024.
- **Teaching Assistant** at IISER-TVM (2021-2025), for the following courses:
  - MAT111 – Single Variable Calculus
  - IDC121 – Mathematical Tools II
  - MAT211 – Multivariable Calculus
  - MAT314 – Numerical Analysis
  - MAT315 – Mathematical Statistics
  - MAT323 – General Topology

Internships

Summer intern — May – June 2019
Chennai Mathematical Insitute — *Chennai, India*

- Undertook a reading project to explore Galois theory, under the guidance of Prof. R. Sridharan.

Indian Academy of Sciences summer intern — May-June, 2018
Chennai Mathematical Insitute — *Chennai, India*

- Engaged in a reading project to explore the theory of rings in algebra, under the guidance of Dr. Manoj Kummini.

Academic Achievements

- (2024) Awarded SERB (Science and Engineering Research Board, Govt. of India) International Travel Scheme grant to attend the conference EQUADIFF-2024 at Karlstad University, Sweden.
- (2023) Awarded NBHM (National Board of Higher Mathematics, Govt. of India) sponsorship to attend International Congress on Industrial and Applied Mathematics (ICIAM)-2023, Tokyo.
- (December 2019) Qualified CSIR (Council of Scientific and Industrial Research, Govt. of India)-National Eligibility test for Junior Research Fellowship with All India Rank 24.
- (June 2019) Qualified CSIR (Council of Scientific and Industrial Research, Govt. of India)-National Eligibility test for Lectureship.
- (2018) Selected for Indian Academy of Sciences Summer Research Fellowship Program(SRFP).
- (2015) Awarded the INSPIRE Scholarship for Higher Education (SHE) by the Department of Science and Technology, Government of India, for the period 2015–2020, in support of higher education in basic sciences.

Organizational Experience

Student organizer February 21 -24, 2024
Latest Advances in Computational and Applied Mathematics-2024 (LACAM-24) *IISER Thiruvananthapuram, Kerala, India.*

Evaluator May 20-21, 2023
Vidyarthi Vigyan Manthan- India's Largest Science Talent Search *IISER Thiruvananthapuram, Kerala, India*

Student member
School Committee on Postgraduate Programs (SCPP) *IISER Thiruvananthapuram, Kerala, India*

Bio data

Date of Birth : 06 May 1997
Nationality : Indian
Blood group : B+ve
Language proficiency : English (Full working proficiency), Malayalam (Native), Hindi, Tamil (Partial fluency)

References

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