Harihara Maharna

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Summary

I am a first-year PhD student in Applied Mathematics in the Applied Computational Mathematics and Statistics (ACMS) Department of the University of Notre Dame, IN, US. I am enthusiastic about learning numerical methods for solving differential equations.

Education

PhD Applied Mathematics

Department of Applied and Computational Mathematics and Statistics (ACMS), University of Notre Dame, South Bend, IN, US. 2024-current

MSc. Mathematics CGPA-8.45/10 (grade cards)

School of Mathematics, IISER Thiruvananthapuram, India 2022-2024

BSc. Mathematics CGPA 9.09/10 (grade sheet)

Department of Mathematics, M. P. C. Autonomous College, Odisha, India 2019-2022

Higher Secondary (10+2) 80.33% (certificate)

Vijayanjai HS Res. School, Odisha, India 2017-2019

Secondary Examination (10th boards) 80.16% (certificate)

Budhabalanga High School, Odisha, India 2016-2017

Projects and Internships

Master's Project Jan-May 2024

Guide: Dr. K. R. Arun, School of Mathematics, IISER Thiruvananthapuram, India

Topic: An asymptotic preserving and energy stable finite volume scheme for the compressible Euler equations with congestion constraint.

- In this project, we designed and analyzed a finite volume scheme for the barotropic Euler equations with the congestion pressure law and performed the singular limit termed as the hard congestion limit at the discrete level.
- The developed scheme was an entropy stable and asymptotic preserving. We also obtained a-priori estimates on the relevant unknowns. We lastly, proved the efficiency of the numerical scheme by testing various numerical examples.

Summer Project Summer 2023

Guide: Dr. Anupam Pal Choudhury, School of Mathematics, NISER Bhubaneswar, India

Topic: Differential Equations.

- In this project, I studied scalar conservation laws and how they model physical phenomena with a particular emphasis on traffic dynamics.
- I learned about weak (or integral) solutions, Rankine-Hugoniot condition, and entropy conditions.

Teaching and Grading

1. **Numerical Analysis** at University of Notre Dame — Spring 25
   - Held office hours and graded homework.
2. **Scientific Programming** at University of Notre Dame — Spring 25
   - Graded homework and practice problems.
3. **Introduction to Numerical Analysis** at University of Notre Dame — Fall 24
   - Held office hours and graded homework.
4. **Probability and Statistics for Data Science** at University of Notre Dame — Fall 24
   - Graded homework and live sessions.

Scholastic Achievements and Fellowships

- National Board for Higher Mathematics (NBHM) Master's scholarship fellow, 2023-24.
- Graduate Aptitude Test in Engineering (GATE)-2022 qualified.
- Joint Admission test for Masters (JAM)-2022 qualified.
- BSc. Mathematics topper (2019-22 batch) in Maharaja Purna Chandra (MPC) Autonomous College.

Workshops and Online Courses

Mathematics Training and Talent Search Programme (MTTS) Level-1
IISER Thiruvananthapuram, India — Summer 2022

- In this 4-week summer school, I attended various lectures in analysis and algebra.

Mathematics Training and Talent Search Programme (MTTS) Level-O
Online (due to COVID) — Summer 2021

Real Analysis-I online course offered by NPTEL
Dr. Jaikrishnan J, Indian Institution of Technology (IIT), Palakkad — Sep - Dec 2020

Online Foundation Course in Mathematics (OFCM)
Online — October 2020

Technical skills

- C++, Python, Matlab, LaTeX.

Work Experience

- Chegg Subject Matter Expert in Calculus. Feb 2022- July 2023