Harihara Maharna

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Summary

I am a PhD student in Applied and Computational Mathematics in the Department of Applied and Computational Mathematics and Statistics (ACMS) at the University of Notre Dame, IN, USA. I am enthusiastic about learning numerical methods for solving differential equations and developing efficient computational techniques for complex mathematical problems.

Education

PhD in Applied and Computational Mathematics

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

- Advisor: Dr. Zhiliang Xu

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

School of Mathematics, IISER Thiruvananthapuram, Kerala, India 2022-2024

BSc in 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

Current Project June 2025-current

Guide: Dr. Zhiliang Xu, ACMS Department, University of Notre Dame, IN, US

Topic: Neural network algorithms for higher-dimensional problems

- In this project, we are developing neural network algorithms for higher-dimensional problems.

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.

Work Experience

Grader and Teaching Assistant

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

Online Education Support

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

Fellowships and Scholastic Achievements

- Departmental Award for highest score in Applied Mathematics qualifying examination, USD 500, ACMS Department, University of Notre Dame, 2025
- NBHM Master's Fellowship, INR 168,000 (over two years), National Board for Higher Mathematics (NBHM), 2023–2024
- Qualified Graduate Aptitude Test in Engineering (GATE), India, 2022
- Qualified Joint Admission Test for Masters (JAM), India, 2022
- Ranked first in BSc Mathematics (2019–2022 batch), Maharaja Purna Chandra (MPC) Autonomous College, Odisha, India

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 — 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

- **Programming Languages:** Python, Matlab, C++, R.
- **Python Libraries:** PyTorch, NGSolve, SimVascular, NumPy, SciPy, Pandas, Matplotlib.
- **Tools:** LaTeX, Git, Jupyter Notebooks.