# MEENAKSHI KRISHNAN

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## EDUCATION

**PhD (AMSC Program)**, University of Maryland College Park — Fall 2021 - Present
Third Year PhD student in the Applied Mathematics, Applied Statistics, and Scientific Computation (AMSC) program at UMD.
GPA: 4.0/4.0

**Bachelor and Master of Mathematics**, IISER-TVM — 2016-2021
Integrated BS-MS degree at the Indian Institute of Science Education and Research Thiruvananthapuram (IISER-TVM) with a major in mathematics and minor in Biology.
GPA: 9.56/10

## CURRENT INTERESTS AND WORK

I am currently advised by Prof. Ramani Duraiswami in the Computer Science Department at the University of Maryland. We are interested in differentiable programming as related to inverse problems in partial differential equations and differentiable meshing of surfaces. We aim to utilize the capabilities of autograd features in Python libraries like Tensorflow, Pytorch and JAX to use gradient-based approaches to solve optimization problems.

## PUBLICATIONS

**A Unified Asymptotic Preserving and Well-Balanced Scheme for the Euler System with Multiscale Relaxation.** Arun, K. R., M. Krishnan, and S. Samantaray. Computers & Fluids 233: 105248, 2022

## SKILLS

**Programming** Python, MATLAB, Mathematica. Familiar with C.
**Languages** English, Malayalam, Tamil, Hindi.

## RESEARCH AND TEACHING EXPERIENCE

**Graduate Research Assistant** — June 2023 - Present
Department of Mathematics, University of Maryland

- I am currently working as a Graduate Research Assistant with Prof. Ramani Duraiswami in the Computer Science Dept at the University of Maryland.

**Graduate Teaching Assistant** — Sept 2021 - June 2023
Department of Mathematics, University of Maryland — *College Park, MD*

- Fall 2021: MATH120 - Elementary Calculus
- Spring 2022: MATH141 - Calculus II
- Fall 2022: MATH120 - Elementary Calculus
- Spring 2023: AMSC661 - Scientific Computing II, AMSC420 - Mathematical Modeling.

**Masters Thesis** — June 2020 - May 2021
Advisor: Dr. K R Arun, IISER-TVM — *Thiruvananthapuram, India*
Project: Asymptotic Preserving (AP) and Structure Invariant Schemes for Hyperbolic Systems with Multiscale Relaxation.

- In this year long project, we design and analyse high order AP Implicit Explicit (IMEX) Runge Kutta schemes for hyperbolic systems with multiscale relaxation.
- The aim of the project was to develop a well-balanced unified AP scheme for stiff hyperbolic systems having both hyperbolic and parabolic relaxation scales, in particular for the Euler system with friction and gravity.

- The results of this project were published in 2022.

**Minor Thesis** Jan 2020 - June 2020
Advisor: Dr. Sabari Sankar Thirupathy, IISER-TVM *Thiruvananthapuram, India*
Project: A Predictive Model for Replication-Transcription Collision in Bacteria.

- As my minor project in Biology, we developed a simplistic model to determine the number of collisions between replication and transcription complexes in bacteria.
- MATLAB was used to develop and build the model which was based on multiple gene and cell parameters like gene length, position, replication and transcription speed, rate of refiring of genes, to name a few.

**DAAD-WISE Project** May 2019 - July 2019
Advisor: Prof. Dr. Mária Lukácová-Medvidová, University of Mainz *Mainz, Germany*
Project: Implementing Implicit Explicit Runge Kutta (IMEX RK) schemes for Stiff Differential Equations.

- Learned more about the significance of asymptotic preserving schemes for stiff-ODEs and hyperbolic relaxation problems put forward by Pareschi et al.
- Examined and established with the help of MATLAB the effectiveness of AP-schemes for relaxation problems designed using the IMEX Runge-Kutta framework.

**IAS-SRFP Project** May 2018 - July 2018
Advisor: Prof. K Sandeep, TIFR-CAM *Bengaluru, India*
Project: Understanding The Principles of Ordinary and Partial Differential Equations

## FELLOWSHIPS

**Dean's Fellowship 2021-2023.** Awarded by the University of Maryland.

**ANU Future Research Talent Award 2020 (canceled due to COVID).** A highly selective travel award granted by the Australian National University (ANU). Was unable to pursue due to the COVID-19 pandemic.

**DAAD-WISE Fellowship 2019.** German Academic Exchange Service's Working Internships in Science and Engineering.

**Mitacs Globalink Research Internship 2019 (declined).** A competitive initiative for international undergraduates from 13 countries to study in Canada. Declined to pursue DAAD-WISE.

**INSPIRE Fellowship 2016-2021.** One of the highest undergraduate fellowships in India. Offered by the Department of Science and Technology of the Govt. of India.

**Indian Academy of Sciences' Summer Research Fellowship 2018.** A summer internship program offered by the Indian Academy of Sciences at the Tata Institute of Fundamental Research - Centre for Applicable Mathematics (TIFR-CAM).

## LEADERSHIP AND EXTRA-CURRICULAR ACTIVITIES

- **Co-President, WIM 2022-23, 2023-24.** Co-President of the Women in Math (WIM) Association at the University of Maryland.
- **Executive Member of the Cultural Council 2019** Was the representative from the Mathematics department to the Cultural Council of the first Student Affairs Council of IISER-TVM.