Megala Anandan

Postdoc

Institute of Mathematics, Johannes Gutenberg University of Mainz, Germany.

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Education

Indian Institute of Science *Bangalore, India*

Ph.D., M. Tech (Research) in Aerospace engineering - Prime Minister's Research Fellow *2019 - 2024*

- Advisor: Prof. S. V. Raghurama Rao
- CGPA: 9.4/10
- Thesis title: On structure preserving numerical schemes for hyperbolic partial differential equations and multiscale kinetic equations

PSG College of Technology *Coimbatore, India*

B.E. in Mechanical engineering *2014 - 2018*

- Thesis advisor: Prof. P. R. Thyla
- CGPA: 9.15/10

Publications

Published

Megala Anandan, Mária Lukácová-Medvidová, S. V. Raghurama Rao. An asymptotic preserving scheme satisfying entropy stability for the barotropic Euler system. *SeMA Journal*, `https://link.springer.com/article/10.1007/s40324-025-00395-7`, 2025. arXiv url: `https://arxiv.org/abs/2503.07284`.

Megala Anandan, S. V. Raghurama Rao. On Lattice Boltzmann Methods based on vector-kinetic models for hyperbolic partial differential equations. *Computers and Fluids*, `https://doi.org/10.1016/j.compfluid.2024.106348`, 15 August 2024. arXiv url: `https://arxiv.org/abs/2401.03952`. Jan 2024.

Megala Anandan, Benjamin Boutin, Nicolas Crouseilles. High order asymptotic preserving scheme for diffusive scaled linear kinetic equations with general initial conditions. *ESAIM: Mathematical Modelling and Numerical Analysis*, `https://doi.org/10.1051/m2an/2024028`, 26 June 2024. arXiv url: `https://arxiv.org/abs/2305.13393`. May 2023.

Megala Anandan, S. V. Raghurama Rao. Entropy conserving/stable schemes for a vector-kinetic model of hyperbolic systems. *Applied Mathematics and Computation*, `https://doi.org/10.1016/j.amc.2023.128410`, 15 March 2024. arXiv url: `https://arxiv.org/abs/2302.08014`. February 2023.

Preprints

Megala Anandan, Benjamin Boutin, Nicolas Crouseilles. Uniformly higher order accurate schemes for dynamics of charged particles under fast oscillating magnetic fields, Accepted in *IMA Journal of Numerical Analysis* .

Conference Proceedings

Megala A, S. V. Raghurama Rao. D2Q9 model of upwind lattice Boltzmann scheme for hyperbolic scalar conservation laws. 8^{th} *European Congress on Computational Methods in Applied Sciences and Engineering*, Scipedia, `https://doi.org/10.23967/eccomas.2022.074`, 05-09 June 2022 at Oslo, Norway.

Published during undergrad

S. Udhayakumar, K. Sadesh, **A. Megala**, R. A. Sindhu. Sensing characteristics of ultrasonic sensors used in robots: A study. International Journal of Innovative Research in Engineering Science and Technology. ISSN 2320-981X. 3(3):64-70. September 2015.

S. Syath Abuthakeer, U Sachin Ganesh, **A Megala**, Nowfal N. Design of Geneva wheel mechanism and its implementation in the table indexing of drilling machine. National Journal of Technology. ISSN 0973-1334. 14(1). March 2018.

Awards, Fellowships, & Grants

2019-2024	**Prime Minister's Research Fellowship (PMRF)**, Ministry of Education, Government of India	*INR 70000-80000/month*
2019-2024	**PMRF contingency research grant**, Ministry of Education, Government of India	*INR 200000/year*

Talks

Contributed Talks

Megala Anandan, Mária Lukácová-Medvidová, S. V. Raghurama Rao. Asymptotic preserving and energy stable numerical schemes for barotropic Euler equations. *numhyp25: Numerical Methods for Hyperbolic Problems*. 09-18 June 2025 at Darmstadt, Germany

Megala A, S. V. Raghurama Rao. A study of Lattice Boltzmann methods based on vector-kinetic models. Oral presentation at *the 33rd International Conference on Discrete Simulation of Fluid Dynamics (DSFD)*. 09-12 July 2024 at ETH Zurich, Switzerland.

Megala A, S. V. Raghurama Rao. Entropy conserving/stable schemes for vector-kinetic and macroscopic models. Oral presentation at *the 19th International Conference on Hyperbolic Problems: Theory, Numerics and Applications (HYP2024)*. 01-05 July 2024 at Shanghai, China.

Megala A, S. V. Raghurama Rao. 2022. A discrete-kinetic entropy conserving and exact discontinuity capturing scheme for scalar conservation laws. Oral presentation at *XVIII International Conference on Hyperbolic Problems: Theory, Numerics, Applications*. 20-24 June 2022 at Málaga, Spain.

Megala A, S. V. Raghurama Rao. D2Q9 model of upwind lattice Boltzmann scheme for hyperbolic scalar conservation laws. Oral presentation at 8^{th} *European Congress on Computational Methods in Applied Sciences and Engineering*. 05-09 June 2022 at Oslo, Norway.

Invited Talks

Megala Anandan. An entropy conservative and exact discontinuity capturing discrete kinetic scheme for scalar conservation laws. Advanced seminars: Institute of Mathematics, Johannes Gutenberg University Mainz, Germany, 2022.

Research Visits

University of Rennes - Institut de Recherche Mathematique de Rennes (IRMAR) — *Rennes, France*

Collaborators: Prof. Nicolas Crouseilles, Dr. Benjamin Boutin — *Jun-Jul 2022, Jan-Mar 2023, Feb-May 2024*

- Project: Higher order asymptotic preserving schemes for kinetic equations with boundary layers
- Project: High order uniformly accurate and energy preserving schemes for fast oscillating magnetic fields

Professional Development

Workshop & Certifications

Fundamentals of Deep Learning - By NVIDIA Deep Learning Institute - I participated in the workshop on Deep learning, took the test and obtained the certification.

Peer Review

Reviewed a research article for **SIAM Journal of Numerical Analysis**.

Teaching

July 2024	**Hyperbolic partial differential equations**, Instructor	*RUAS, Bangalore*
Aug ’23 - Dec ’23	**Fluid Dynamics**, Teaching Assistant	*IISc, Bangalore*
Oct ’22 - June ’23	**Hyperbolic partial differential equations and computational aspects**, Instructor	*RVCE, Bangalore*
Jan ’22 - Sep ’22	**Hyperbolic problems and computational aspects**, Instructor	*RUAS, Bangalore*
Feb ’21 - Nov ’21	**Hyperbolic partial differential equations - Theory and computation**, Instructor	*RVCE, Bangalore*

Mentoring

Jan ’22 - Dec ’23	**Naman Manoj Ladhad, Nihal Hebbar**, Undergrad students, RV College of Engineering (RVCE),Bangalore
May ’23 - Jan ’24	**Dushyant Dixit**, Masters student, IIT Kharagpur

Languages

English - Proficient/Fluent

German - A2

Tamil - Native