RAJESH NAKKA

338rajesh@gmail.com | +91-8125240324 | 338rajesh.github.io | 338rajesh

Education

Aug'2018 — Jul'2023 **Ph.D., Indian Institute of Science** in Aerospace Structures, on *Prediction of multi-physical properties of fibre-reinforced composites using deep learning*.

- Developed a universal overlap detection scheme and its removal by solving a constrained optimisation problem.
- An abnormal behaviour is observed while studying the influence of fibre cross-sectional profile on the effective multi-physical properties of uni-directional composite materials.
- Convolutional neural networks model is developed to predict the properties of composite material that is applicable for all practical fibre volume fractions and a wide range of fibre-matrix material systems.
- I had the opportunity to learn and use Julia, Python, gmsh, PyTorch and git extensively in this work.

Aug'2012 — Jul'2014 **M.Tech. Mechanical Engg., IIT Bombay** in Machine Design, with thesis on *Finite Element Simulation of Bulk Wave Propagation in Non-Linear Solids*.

- Equations governing bulk wave propagation in the infinitely long cylindrical rod are solved analytically and numerically
- Enhancement of second harmonic amplitude is obtained analytically and numerically, using a di-chromatic input wave.
- In this work, I have used ANSYS APDL and MATLAB tools.

Aug'2008 — Jul'2012 **B.Tech. Mechanical Engg., JNTUH College of Engineering, Hyderabad.**

Employment History

Aug'2023 – Dec'2023 **Post-doctoral research (consultant)** in designing twin screw compressor rotor profile using generative learning at City, University of London. My role involves building and training conditional generative adversarial neural networks that can produce novel rotor profiles.

Aug'2015 – Nov'2016 **Assistant Professor** at Mechanical Engineering Department, Bapatla Engineering College, India. I enjoyed teaching the mechanics of materials course for undergraduate students in two semesters.

Aug'2014 – July'2015 **PGET** Post Graduate Engineer Trainee at Mahindra Research Valley, Mahindra & Mahindra, Chennai, India.

Research Interests

- Mechanics of homogeneous and heterogeneous materials
- Multi-scale modelling and analysis
- Computational mechanics
- Scientific machine learning

Skills

Coding languages	Python (4/5), Julia (4/5), LaTeX (4/5), Git (3/5), …
FEA softwares	Abaqus, gmsh, FreeCAD, ANSYS APDL,
Deep learning Frameworks	PyTorch, TensorFlow
Misc.	Asymptote: The Vector Graphics Language,
Languages	English, Telugu and Hindi.

Research Publications

Journal Articles

1. P. K. Attada, **Rajesh Nakka**, D. harursampath, and S. A. Ponnusami, "Computational evaluation of absorption characteristics ofceramic-based auxetic materials in x-band frequencyrange," *Smart Materials and Structures*, Aug. 2023. DOI: 10.1088/1361-665x/acf53d.
2. **Rajesh Nakka**, D. Harursampath, and S. A. Ponnusami, "A generalised deep learning-based surrogate model for homogenisation utilising material property encoding and physics-based bounds," *Scientific Reports*, vol. 13, no. 1, Jun. 2023. DOI: 10.1038/s41598-023-34823-3.
3. **Rajesh Nakka**, A. P. Kumar, D. Harursampath, and S. A. Ponnusami, "Influence of fibre cross-section profile on the multi-physical properties of uni-directional composites," *Composite Structures*, vol. 321, p. 117 321, Oct. 2023. DOI: 10.1016/j.compstruct.2023.117321.
4. **Rajesh Nakka**, D. Harursampath, M. Pathan, and S. A. Ponnusami, "A computationally efficient approach for generating RVEs of various inclusion/fibre shapes," *Composite Structures*, vol. 291, p. 115 560, Jul. 2022. DOI: 10.1016/j.compstruct.2022.115560.

Conference Proceedings

1. **Rajesh Nakka**, A. P. Kumar, D. Harursampath, and S. A. Ponnusami, "Multi-physical property prediction of fibre-reinforced composites using convolutional neural networks," International Conference on Composite Materials, Belfast, 2023.

Positions of Responsibility

- **System administrator** of a high-performance computing cluster at NMCAD lab, from 2021-2023.
- **Teaching assistant** for the flight vehicle structures course at IISc, Bengaluru during the 2020 fall and 2022 fall semesters.
- **Core member** of the AERES-2023, the Aerospace Department's annual research symposium at IISc, Bengaluru.

References

Dr. Dineshkumar Harursampath
Head, NMCAD Laboratory
Department of Aerospace Engineering,
Indian Institute of Science, Bengaluru,
Karnataka, India.
mail: dineshkumar@iisc.ac.in

Dr. Sathiskumar A Ponnusami
Aeronautics and Aerospace Research Centre,
Department of Engineering,
City, University of London,
Northampton Square, London, United Kingdom.
mail: sathiskumar.ponnusami@city.ac.uk