

## Research Interests

Domain-informed AI; physics-/biophysics-informed learning; scientific machine learning; PDE-constrained learning; computational fluid dynamics; medical imaging; inverse problems.

## Education

**Ph.D. – Mechanical Engineering, IIT Madras, India** (Jan 2015 – Mar 2021)

Supervisor: Prof. Balaji Srinivasan (Mech Engg & Wadhvani School of Data Science & AI)

Thesis: *Physics Enhanced Machine Learning Methods for Flow Simulation*.

Best PhD Thesis Award in Data Science, 2021 (IIT Madras).

**M.Tech – Applied Mechanics, IIT Delhi, India** (Jul 2012 – Nov 2014)

**B.E. – Mechanical, IET-DAVV, India** (Jul 2007 – May 2011)

## Research Experience

**Postdoctoral Researcher – CREATIS Biomedical Imaging Laboratory, INSA-Lyon, France** (Nov 2024 – Now)

Biophysics-informed medical imaging; curriculum-learning PIELMs for hemodynamic flows; inverse problems.

**Postdoctoral Researcher – State University of New York at Albany NY, USA** (Jul 2023 – May 2024)

ML-based tropical cyclone intensity estimation; evaluation of CNN backbones (AlexNet variants) for Dvorak-style tasks.

**Postdoctoral Researcher – Robert Bosch Center for Data Science and AI, IIT Madras, India** (Jul 2022 – Mar 2023)

Physics-informed medical image segmentation; PDE-constrained regularization for fast contour selection.

## Industry Experience

**Data Scientist – Vunet Systems, Bangalore, India** (Apr 2020 – Jun 2022)

ML analytics for business/performance observability platforms; time-series anomaly detection and KPI attribution.

## Publications (Selected)

1. **Dwivedi, V.**, Sixou, B., & Sigovan, M. (2025). Curriculum learning-driven PI-ELMs for fluid flow simulations. *Neurocomputing*. doi:10.1016/j.neucom.2025.130924.
2. **Dwivedi, V.**, Srinivasan, B., & Krishnamurthi, G. (2024). Physics-informed contour selection for rapid image segmentation. *Scientific Reports*. doi:10.1038/s41598-024-57281-x.
3. **Dwivedi, V.**, & Srinivasan, B. (2021). A normal equation-based extreme learning machine for solving linear PDEs. *Journal of Computing and Information Science in Engineering (ASME)*. doi:10.1115/1.4051530.
4. **Dwivedi, V.**, Parashar, N., & Srinivasan, B. (2020). Distributed learning machines for solving forward and inverse PDE problems. *Neurocomputing*. doi:10.1016/j.neucom.2020.09.006.
5. **Dwivedi, V.**, & Srinivasan, B. (2020). Solution of biharmonic equation in complicated geometries with PIELM. *Journal of Computing and Information Science in Engineering (ASME)*. doi:10.1115/1.4046892.
6. **Dwivedi, V.**, & Srinivasan, B. (2019). Physics informed extreme learning machine (PIELM) – a rapid method for the numerical solution of PDEs. *Neurocomputing*. doi:10.1016/j.neucom.2019.12.099.

## Conference Proceedings

- **Dwivedi, V.** (2024). Global versus Local: Evaluating AlexNet Architectures for Tropical Cyclone Intensity Estimation. In: *Proc. 27th International Conference on Pattern Recognition (ICPR)*, LNCS (Springer). [Springer Link](#).

## Presentations (Selected)

- **Dwivedi, V.**, Sigovan, M., & Sixou, B. (Dec 2025). Curriculum-Learning PIELMs for Hemodynamic Flows. **17th OPT Workshop @ NeurIPS, San Diego, USA.**
- **Dwivedi, V.**, Sigovan, M., & Sixou, B. (Dec 2025). Empirical-Bayes XTFC for Inverse Parameter Estimation. **17th OPT Workshop @ NeurIPS, San Diego, USA.**
- Srinivasan, A G, **Dwivedi, V.** & Srinivasan, B. (Dec 2025). Deep vs. Shallow: Benchmarking Physics-Informed Neural Architectures on the Biharmonic Equation. **8th ML4PS Workshop @ NeurIPS, San Diego, USA.**

## Preprints / Under Review

1. **Dwivedi, V.**, Srinivasan, B., Sigovan, M., & Sixou, B. (2025). Kernel-Adaptive PI-ELMs for Forward and Inverse Problems in PDEs with Sharp Gradients. [arXiv:2507.10241](#). (Submitted to Neurocomputing)
2. **Dwivedi, V.**, Schiassi, E., Sigovan, M., & Sixou, B. (2025). Gated X-TFC: Soft Domain Decomposition for Forward and Inverse Problems in Sharp-Gradient PDEs. [arXiv:2510.01039](#). (Submitted to Neurocomputing)
3. Srinivasan, A G, Said, J., Pentela, S., **Dwivedi, V.** & Srinivasan, B. (2025). Towards Fast Option Pricing PDE Solvers Powered by PIELM. [arXiv:2510.04322](#). (Submitted to ICAIF-2025)

## Honors & Service

- **Best PhD Thesis Award in Data Science (2021)**, IIT Madras.
- **Invited Lecture**: “Scientific Machine Learning for Fluid Mechanics”, IIT Kanpur (6 Nov 2023).
- **Keynote Speaker**: International Conference in Applied Mechanics, Machine Learning and Applied Computation (2022), NIT Raipur.
- **MOOC**: Short course on Data-Centric AI, NPTEL.
- **Reviewer**: *Neurocomputing*, *Scientific Reports*, *Applied Mathematical Modelling*.
- **GATE 2011**: AIR 325/81175 (Mechanical Engineering).
- **Scholarships**: MHRD scholarship during Masters and PhD.

## Teaching & Mentoring (Selected)

- Teaching interests: Scientific ML; Numerical Methods; CFD; Optimization; Machine Learning for Imaging.
- Mentored junior researchers and interns across projects in physics-informed ML and computer vision.

## Technical Skills

<b>Programming</b>	Python, MATLAB; TensorFlow; NumPy/SciPy; scikit-learn; optimization & numerical linear algebra
<b>Domains</b>	Physics-/biophysics-informed learning, PDE-constrained optimization, CFD, medical imaging, inverse problems
<b>Tools</b>	Git, Linux; LaTeX; data visualization and scientific plotting

## References

### Prof. Balaji Srinivasan

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### Prof. Ganapathy Krishnamurthi

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