DR. ARIJIT SINHABABU

Assistant Professor (Tenure), Department of Production Engineering
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PROFESSIONAL SUMMARY

An Assistant Professor (Tenure) at VJTI, Mumbai, with postdoctoral experience from IIT Bombay and a Ph.D. from IIT Bhubaneswar. My research focuses on developing high-fidelity computational models for complex fluid dynamics and materials science problems. I specialize in Direct Numerical Simulation (DNS) and Phase-Field methods with applications in advanced manufacturing processes, solidification, and microstructure evolution, aiming to contribute to impactful research and quality teaching.

EDUCATION

Indian Institute of Technology Bhubaneswar Oct 2021
Doctor of Philosophy (Ph.D.), Mechanical Engineering

Indian Institute of Technology Bhubaneswar July 2014
Master of Technology (M.Tech.), Mechanical Engineering CGPA: 8.59/10.00

West Bengal University of Technology (WBUT) May 2012
Bachelor of Technology (B.Tech.), Mechanical Engineering CGPA: 8.28/10.00

ACADEMIC & RESEARCH EXPERIENCE

Veermata Jijabai Technological Institute (VJTI), Mumbai July 2025 – Present
Assistant Professor (Tenure), Department of Production Engineering

- Teaching undergraduate and postgraduate courses including Operations Research, FEM, Supply Chain Management, and Lean Manufacturing.
- Mentoring B.Tech. and M.Tech. student projects in computational modeling of manufacturing processes.

Indian Institute of Technology Bombay Jan 2022 – Feb 2025
Institute Post-doctoral Fellow, Department of Mechanical Engineering

- Developed a high-order phase-field solver for binary alloy solidification at high Lewis numbers.
- Created a micro-elasticity-based solver for sintering problems.
- Served as a Teaching Assistant in the 'Makerspace' laboratory for two semesters.

Indian Institute of Technology Bhubaneswar July 2014 – Oct 2021
Ph.D. Research Scholar, School of Mechanical Sciences

- Developed and validated a novel dealiasing scheme (RPSM) for accurate Direct Numerical Simulation (DNS) of under-resolved flows with strong shocks and gradients.
- Created an efficient, high-order pseudo-spectral Phase-Field model for simulating dendritic solidification without requiring adaptive mesh refinement

(AMR).
- Implemented an Immersed Boundary-based volume penalization scheme to study microstructure evolution in complex geometries using Cahn-Hilliard equations.

RESEARCH INTERESTS

- Computational Modeling of Manufacturing Processes (Additive Manufacturing, Welding)
- Phase-Field Modeling of Solidification and Microstructure Evolution
- Direct Numerical Simulation (DNS) of Multiphase and Turbulent Flows
- High-Performance Computing for Thermal-Fluid Systems

TEACHING INTERESTS

- Numerical Methods in Engineering
- Computational Materials Science
- Computational Fluid Dynamics (CFD)
- Fluid Mechanics & Heat Transfer
- Modeling of Manufacturing Processes

TECHNICAL SKILLS

Programming Languages: Python, C++, C
Software & Libraries: MATLAB, CUDA, MPI, OpenFOAM, FFTW3
Familiar With: COMSOL, ANSYS Fluent, Git Version Control

PUBLICATIONS

Peer-Reviewed Journal Articles

[1] **Sinhababu, A.**, & Karagadde, S. (2025). A FFT-based phase-field framework for simulating dendritic growth in binary alloy. *Journal of Computational Physics*, 522, 113600.

[2] **Sinhababu, A.**, & Bhattacharya, A. (2022). A pseudo-spectral based efficient volume penalization scheme for Cahn-Hilliard equations in complex geometries. *Mathematics and Computers in Simulation*, 198, 213-233.

[3] **Sinhababu, A.**, & Bhattacharya, A. (2022). A fixed grid based accurate phase-field method for dendritic solidification in complex geometries. *Computational Materials Science*, 201, 110973.

[4] **Sinhababu, A.**, & Ayyalasomayajula, S. (2021). An Improved Dealiasing Scheme for the Fourth Order Runge-Kutta Method. *Intl. Journal for Numerical Methods in Fluids*, 93(2), 506-538.

[5] **Sinhababu, A.**, Bhattacharya, A., & Ayyalasomayajula, S. (2021). An Efficient Pseudo-spectral based Phase Field Method for Dendritic Solidification. *Computational Materials Science*, 188, 109967.

[6] **Sinhababu, A.**, & Ayyalasomayajula, S. (2021). Accuracy and Computational Efficiency of Dealiasing Schemes for the DNS of Under Resolved Flows. *Mathematics and Computers in Simulation*, 182, 695-722.

ACHIEVEMENTS

- **Qualified GATE 2012** in Mechanical Engineering.
- **Developed high-fidelity DNS and Phase-Field codes** from scratch in C++ and FFTW, implementing novel dealiasing schemes during Ph.D. research.

REFERENCES

Dr. Anirban Bhattacharya, Associate Professor, IIT Bhubaneswar
Email: anirban@iitbbs.ac.in

Prof. Shyamprasad Karagadde, Professor, IIT Bombay
Email: s.karagadde@iitb.ac.in

Prof. M. P. Gururajan, Professor, IIT Bombay
Email: guru.mp@iitb.ac.in