

# Divyesh Mistry

Ph.D. Research Scholar, IIT Bombay, Mumbai, India-400076

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## 🎓 Education

- Jan 2019 - present** 🎓 **Doctorate**, Aerospace Engineering, Indian Institute of Technology - Bombay, Mumbai-400076  
*Advisors* : Prof. Amuthan A. Ramabathiran, Prof. P J Guruprasad  
*Funding* : MHRD Teaching Assistantship through Project (TAP)  
*Thesis* : Multiscale Modeling of Prior Particle Boundaries in Nickel-based Superalloys  
*Key Subjects* : Multiscale Modeling of Materials, Continuum Mechanics, High Performance Scientific Computing, Tensors for Engineers, Parallel Scientific Computing and Visualization  
*Final Grade* : 9.36/10
- June 2014 - July 2016** 🎓 **M.Tech.**, Mechanical Engineering, Indian Institute of Technology - Kharagpur, West Bengal-721302  
*Post Graduation Specialization* : Mechanical System Design  
*Advisor* : Prof. Manas Chandra Ray  
*Funding* : MHRD GATE Fellowship  
*Thesis* : Simple Mesh Free Model for Static Analysis of Smart Composite Beams  
*Key Subjects* : Advanced Mechanics of Solids, Fracture Mechanics, Mechanics of Composites, Vibration Analysis, Applied Elasticity, Finite Element Method  
*Final Grade* : 8.85/10
- December 2013** 🎓 **B.E.**, Aeronautical Engineering, The Aeronautical Society of India, New Delhi  
*Graduation Specialization* : Aero Mechanical  
*Key Subjects* : Aircraft Structures, Aerodynamics, Propulsion, Aircraft Stability & Control, Solid Mechanics, Fluid Mechanics

## ☰ Competences



- Programming** </> Python, C++, High Performance Computing (OpenMP, MPI), Unix/Linux Shell scripting, Git, GitHub, MATLAB
- Packages** 🔧 LAMMPS, ATOMSK, OVITO, NEPER, Ansys, ABAQUS, AutoCAD, LaTeX, Gnuplot
- Data Analysis** 📊 scikit-learn, pandas, NumPy, SciPy, Matplotlib
- Operating Systems** 🖥️ Ubuntu, macOS, Windows
- Languages** 🗣️ Reading, writing and speaking competencies in English, Hindi and Gujarati.

## 📚 Teaching Experience

- June 2016 – Dec 2018** 👤 **Assistant Professor**, CMR Institute of Technology, Mechanical Engineering, Bangalore-560037, India
- 📋 **Curriculum Development** : Led the development of the Mechanical Engineering program as a committee member at CMR University.
  - ⚙️ **Workshop Organization** : Conducted workshops on MATLAB, Python, and ANSYS, enhancing undergraduate students' practical skills.
  - 👤 **Teaching Excellence** : Delivered courses on Experimental Stress Analysis and Finite Element Methods, while managing CAD, Design, and Engineering workshops.

## Teaching Experience (continued)

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- Jan 2019 – Present**  **Institute Teaching Assistant, IIT Bombay, Aerospace Engineering, Mumbai-400076**  
*Subject : Continuum Mechanics, Data Analysis and Interpretation, Multiscale Modeling of Materials, Finite Element Method*
- June 2014 – July 2016**  **Institute Teaching Assistant, IIT Kharagpur, Mechanical Engineering, Mumbai-400076**  
*Subject : Vibrational Analysis, Finite Element Method, Tribology Laboratory*





## Research Projects

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- June 2019 – Present**  **Multiscale Modeling Of Prior Particle Boundaries in Nickel-based Superalloys**  
Funding agency : **Defence Metallurgical Research Laboratory (DMRL)**  
Advisor : Prof. P J Guruprasad, Prof. Amuthan A. Ramabathiran  
Tools : LAMMPS, OVITO, AtomsK, Polycrystalline DDD, Python, HPC  
Developed a multiscale material model to study dislocation behavior, stress distribution, and strengthening mechanisms around PPBs and  $\gamma/\gamma'$  phases.  
Developed integrated shell scripts that coordinate LAMMPS simulations with Python and AtomsK, creating parameter-varying workflows to efficiently explore material configurations.  
Addressed challenges in modeling complex interactions between PPBs and dislocation dynamics in Ni-based superalloys.
- Jan 2022 – Present**  **Dislocation Avalanche Mechanisms in Metallic Materials**  
Funding agency : **Industrial Research and Consultancy Centre (IRCC)**  
Advisor : Prof. P J Guruprasad, Prof. Amuthan A. Ramabathiran  
Tools : C++, 2D DDD, Python  
Investigating dislocation avalanche dynamics and plastic deformation mechanisms in metallic materials.
- Aug 2022 – Dec 2022**  **MPI-Enabled Molecular Dynamic Code Development**  
Coursework project : HPC(ME766)  
Tools : C++, MPI, OpenMP, HPC  
Developed a molecular dynamics simulation code with efficient parallel algorithms for optimized computational performance.
- June 2014 – July 2016**  **A Simple Mesh-Free Model for Static Analysis of Smart Composite Beams**  
Funding agency : **Ministry of Human Resource Development**  
Advisor : Prof. Manas Chandra Ray  
Tools : MATLAB, Ansys, Abaqus  
Analyzed smart composite beams reinforced with piezoelectric materials.

## Certifications

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- Jan 2020**  **Using Python for Research**, edX, HarvardX, Harvard University.
- Aug 2020**  **The Unix Workbench**, Coursera, Johns Hopkins University.
- Aug 2020**  **Material Behavior**, Coursera, Georgia Institute of Technology.
- May 2018**  **A Hands-on Introduction to Engineering Simulations**, edX, CornellX, Cornell University.

## Publications and Conference Proceedings

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- [1] Mistry D., & Ramabathiran A. A., **A Molecular Dynamics Study of Size Effects for Critical Resolved Shear Stress in Nickel Superalloys**, (2025, submitted). arXiv preprint : doi.org/10.48550/arXiv.2504.16409
- [2] Mistry D., Guruprasad P. J., & Tawqeer N., **Polycrystalline Discrete Dislocation Dynamics Framework for Ni-based Superalloys with Prior Particle Boundaries (PPB)**, Communicated.
- [3] Mistry D., Guruprasad P. J., & Ramabathiran A. A., **An atomistically informed discrete dislocation dynamics study of prior particles boundaries in Ni superalloys**, 17th Conference of COMPLAS Series, 06 Sep 2023, Barcelona, Spain.

## Positions of Responsibility

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June 2021 – July 2022  **Department Placement Coordinator (DPC)**, Department of Aerospace Engineering, IIT Bombay

## Awards, Achievements, and Honorable Mentions

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| 2013 |    | <b>Permanent Membership</b> : Awarded permanent membership as an <b>Associate Member</b> at the <b>Aeronautical Society of India</b> |
| 2014 |    | <b>All India Rank 69</b> : Achieved in the Graduate Aptitude Test in Engineering (GATE)  |
| 2019 |    | MHRD Teaching Assistantship Through Project : Awarded by the <b>Industrial Research and Consultancy Centre (IRCC)</b>                |
| 2023 |   | IIT Bombay Travel Grant : Awarded to attend the international conference <i>COMPLAS 2023</i> , Spain                                 |
| 2025 |  | Institution of Eminence Funds, IIT Bombay : Awarded to attend the international conference <i>TMS 2025</i> , USA                     |
| 2025 |  | <b>Membership</b> : Member of The Minerals, Metals & Materials Society (TMS), USA  |

## References

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### **Prof. Amuthan A. Ramabathiran (Ph.D. Supervisor)**

Assistant Professor, Aerospace Engineering, California Poly State University, CA 93407, USA

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📞 805-756-0873

📍 Preferred contact via email.

### **Prof. P J Guruprasad (Ph.D. Supervisor)**

Professor, Aerospace Engineering, Indian Institute of Technology - Bombay, Mumbai-400076, India

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📍 Available for contact during working hours.

### **Prof. Amit Singh (RPC Chairperson)**

Associate Professor, Mechanical Engineering, Indian Institute of Technology - Bombay, Mumbai-400076, India

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