SWAPNIL SHADANAN BHURE

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EDUCATION

Doctor of Philosophy in Materials Engineering
Jan 2020 - Present

Indian Institute of Science, Bangalore, Karnataka

CGPA: 8.7/10.0 (Course work)

Master of Engineering in Design Engineering
Aug 2017 - Jun 2019

Birla Institute of Science and Technology, Pilani – Pilani Campus, Rajasthan

CGPA: 8.74/10.0

Bachelor of Engineering in Mechanical Engineering
Aug 2011 - Jun 2015

Yeshwantrao Chavan College of Engineering, Nagpur (An Autonomous Institution)

Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Maharashtra

CGPA: 7.62/10.0

RESEARCH EXPERIENCE

PhD Research
Jan 2020 - Present

Supervisor: Prof. Abhik Choudhury

Department of Materials Engineering, IISc, Bangalore

Topic: Multi-scale modelling and experimental study of metal additive manufacturing process

- The aim of this research is to manufacture crack-free single crystal Ni-based superalloy parts using additive manufacturing.
- Developed a process model to simulate heat transfer and fluid flow for multi-layer deposition during AM process.
- Developed a grand-potential and orientation-field-based phase-field model to simulate columnar to equiaxed transition (CET) and micro-segregation.
- Developed a Monte-Carlo based model to simulate grain growth during AM process.
- Conducted directed energy deposition (DED) based AM experiments to validate process and microstructure model

Junior Research Fellow
Jul 2019 - Dec 2019

Supervisor: Prof. Abhik Choudhury

Department of Materials Engineering, IISc, Bangalore

Topic: Modelling and simulation of heat transfer and fluid flow in metal additive manufacturing (AM)

- Implemented heat transfer and fluid flow model for metal AM process in OpenFOAM.
- It incorporated the important melt pool dynamics like Marangoni flow, buoyancy, viscous effects, and latent heat evolution.
- The thermal gradients and solidification velocities obtained showed excellent agreement with the experimental results.

Master's Thesis
Jan 2019 - Jun 2019

Supervisor: Prof. Murali Palla

Department of Mechanical Engineering, BITS, Pilani – Pilani Campus

Topic: Modelling and simulation of microstructure evolution in metal additive manufacturing (AM)

- Wrote C++ codes to simulate heat transfer and solute diffusion using the finite difference method.

- Obtained liquid steel to the austenite phase transformation with nucleation and grain growth model using cellular automata method; obtained dendrite formation and solute segregation patterns for multi-layered metal deposition in a 2-D lattice.
- Simulated the solid-state transformation using the phase-field method to obtain austenite to pearlite and martensite transformations.

TEACHING EXPERIENCE

Guest Lecturer - Foundations and Applications of Modelling and Simulation   Aug 2022 - Present
- Department of Metallurgical and Materials Engineering, VNIT, Nagpur
- Introduced a two-part certification course on foundations and applications of modelling and simulation for UG students. Part-1 consisted of 14-hours of lectures with 7 hours of theory lectures and 7 hours of hands-on Python coding tutorials.
- 13 students were awarded the course completion certificate on clearing an evaluation exam.

Guest Lecturer - Foundations of modelling and simulation for mechanical engineers
- Department of Mechanical Engineering, YCCE, Nagpur   Jan 2022 - April 2022
- Conducted a 16-hour course for third year UG students. It contained 9 hours of theory lectures and 7 hours of hands-on Python tutorials.
- 15 students earned academic credit points and certificates for attending and completing this course.

Guest Lecturer - Foundations of Modelling and Simulation   Sept 2021 - Dec 2021
- Department of Metallurgical and Materials Engineering, VNIT, Nagpur
- Introduced a short-term certification course on foundations of modelling and simulation for UG and PG students. This 16-hour lecture series consisted of 9 hours of theory lectures and 7 hours of hands-on Python coding tutorials.
- 13 students were awarded the course completion certificate on clearing an evaluation exam.

Teaching Assistant (TA) - Modelling and Simulation in Materials Engineering   Aug 2021 - Dec 2021
- Department of Materials Engineering, IISc, Bangalore
- Conducted 13+ hours of coding tutorials for UG, PG and PhD students in the course and helped the students with doubt clearing and course instructor with assessment.

Guest Lecturer - Computational modelling and simulation for mechanical engineers
- Department of Mechanical Engineering, YCCE, Nagpur   Feb 2021 - May 2021
- Introduced a 15-hour lecture series cum certification course on computational modelling and simulation for third and fourth year UG students. It contained 9 hours of theory lectures and 6 hours of hands-on Python tutorials.
- Conducted an additional 3 hours of career counselling session for mechanical engineering UG students.

AWARDS AND POSITIONS OF RESPONSIBILTY

Convenor - 35th Annual Students' Symposium   April 2022
- Department of Materials Engineering, IISc, Bangalore
- Core member of the organizing committee for 2-day students' symposium.
- Organized 4 invited talks, 19 platform presentations, 15 poster presentations and a materialography contest.

Prime Minister's Research Fellowship   Aug 2020 – Present
Awarded by Ministry of Education, Government of India for a period of four years.

COMPUTER SKILLS

Language: C++, Python, Linux Shell Script, LaTeX

Software: OpenFOAM, MATLAB, Octave, Simufact Additive, Thermo-Calc, PTC Creo 3.0, ANSYS Fluent 19.0

INTERESTS AND HOBBIES

Gardening; crafts; architecture; visual arts and stories; music; biomimicry; Indian scriptures

LANGUAGES

Marathi (mother tongue), Hindi (native), English (full professional proficiency)

REFERENCES

1. Prof Abhik N Choudhury, Engineering, IISc, Bangalore (abhiknc@iisc.ac.in)
2. Prof Murali Palla, Mechanical Engineering, BITS, Pilani (murali.palla@pilani.bits-pilani.ac.in)
3. Prof Satyam Suwas, Chairman, Materials Engineering, IISc, Bangalore (satyamsuwas@iisc.ac.in)