

Shiva Kumar Gaddam

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Research Interests

Crystal plasticity finite element modelling, Phase field modelling of fracture, Scaled boundary finite element method.

Education

- Jul '22 - present **Indian Institute of Technology Madras**, Tamilnadu, India.
Doctor of Philosophy – Metallurgical and Materials Engineering, CGPA – 9.25/10
- Aug '20 - Jun '22 **Indian Institute of Technology Indore**, Madhya Pradesh, India.
Master of Technology – Metallurgy Engineering, CGPA – 9.39/10
- Oct '12 - May '16 **JNTUH College of Engineering Manthani**, Telangana, India.
Bachelor of Technology – Mechanical Engineering, Percentage – 68.86

Current Research

- Title *Computational study of initiation and propagation of cracks in metallic materials*
- Supervisor Prof. Anand Krishna Kanjarla
Laboratory for mechanics of microstructures,
Dept. of Metallurgical and Materials Engineering, IIT Madras.
- Duration Jul '22 - present
- Description
 - The aim is to develop a numerical framework that combines phase-field modelling with crystal plasticity using the scaled boundary finite element method to simulate nucleation and propagation of cracks in metallic materials.
 - The developed framework will be used to understand the effect of microstructural features on crack nucleation and propagation in metals.

Master's Thesis

- Title *Continuum mechanics based modelling of material deformation*
- Supervisor Prof. Abhijit Ghosh
Microstructure and Texture Engineering Laboratory,
Dept. of Metallurgy Engineering and Materials Science, IIT Indore.
- Co-Guide Prof. Saikat Sarkar, Dept. of Civil Engineering, IIT Delhi.
- Duration Jul '21 - Jun '22
- Description
 - Studied the effect of crystallographic anisotropy and crystal orientation on the formation of shear bands during ductile fracture in Fe single crystals.
 - Explored the modelling of shear band formation through crystal plasticity simulations using DAMASK.

Research Publications

- Kumar, G.S.**, Varma, T.V., Ghosh, A. et al. Effect of Crystal Orientation and Crystallographic Anisotropy on Shear Band Formation During Ductile Fracture in Fe Single Crystals. *Metall Mater Trans A* 55, 598–606 (2024). doi: 10.1007/s11661-023-07271-x

Bachelor's Projects

- Title *Design and development of an ornithopter using Autodesk Inventor*
Supervisor Prof. K. Prasanna Lakshmi
Dept. of Mechanical Engineering, JNTUHCCEM.
Duration Jan '16 - May '16
Description
 - Studied the flight theory and techniques of different kinds of birds to understand their superior aerodynamic efficiency.
 - Designed and developed a 3D CAD model of a remote-controlled ornithopter using Autodesk Inventor to achieve aerodynamic efficiency close to that of a bird.
- Title *Design and fabrication of pedal powered multiple machining machine*
Supervisor Prof. K. Prasanna Lakshmi
Dept. of Mechanical Engineering, JNTUHCCEM.
Duration Jul '15 - Dec '15
Description
 - Designed and fabricated a pedal-powered machine that performs basic machining operations such as drilling, cutting and grinding simultaneously.

Industrial Experience

- Mar '17 - Dec '17 **GIS Engineer**, RMSI PVT. LTD., Hyderabad, India.
 - developed digital maps for mobile and web applications.
 - worked as a quality controller to ensure the quality of the maps.
- May '15 - Jun '15 **Manufacturing Intern**, BHARAT HEAVY ELECTRICALS LIMITED, Hyderabad, India.
 - Completed industrial training in turbines and compressors - production department.
 - Studied the different types of steam turbine blades, their profiles, roots, and the various manufacturing techniques involved.

Technical Skills

- Programming MATLAB, Fortran, Python, Git, OpenMP, MPI
CAD AutoCAD, Autodesk Inventor Pro, Fusion 360, Catia
CAE Ansys, Abaqus, DAMASK, Gmsh
Other MS-Excel (Office), L^AT_EX, ParaView

Academic Courses

- Applied finite element analysis
- Parallel scientific computing
- Micromechanics
- Computational methods in engg
- Mathematical methods for chemical engineers
- Nonlinear finite element analysis of solid continua
- Advanced phase transformations
- Mechanical behaviour of materials
- Defects in materials

Positions of Responsibility

Graphic Designer, Dhiyonaha Media Board | JNTUHCCEM.

Designed cover pages and interiors of two issues of university magazines.

Graphic Designer, Student Activity Center | JNTUHCCEM.

Designed brochures, vinyl banners, logos, posters, certificates for various events and technical fests.

Awards & Achievements

- 2020 Secured an **All-India-Rank of 7549** in GATE 2020 - Mechanical Engineering, amongst 1,37,826 candidates.
- 2014 Participated in the final round of “All India Aerotrix Super Challenge” competition organized by AerotriX in association with “Conscientia-14” at IIST Trivandrum.