Shiva Kumar Gaddam

Ph.D. Scholar,
Metallurgical and Materials Engineering, IIT Madras.

Chennai, Tamilnadu, India
+91-8688468107
shivakumar.gdm@gmail.com
mm22d014@smail.iitm.ac.in
shivakumargaddam.github.io
linkedin.com/in/shivakumargaddam

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, JNTUHCEM.

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, JNTUHCEM.

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), LaTeX, 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 | JNTUHCEM.
Designed cover pages and interiors of two issues of university magazines.

Graphic Designer, Student Activity Center | JNTUHCEM.
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.

Reference

Prof. Anand Krishna Kanjarla
Associate Professor
Department of Metallurgical and Materials Engineering
Indian Institute of Technology Madras
Chennai - 600036, Tamilnadu, India
Phone: +91 2257 4753
Email: kanjarla@iitm.ac.in