

Shubham Sharma

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Education

Indian Institute of Science, Bengaluru, Ph.D in Structural Engineering August 2019 – July 2025

- GPA: 8.7/10
- **Thesis title:** Virtual Element Methods for Phase Field Fracture: Mesh Transitions, Composite Damage, and Stabilization-Free Formulations
- **Skills** - Finite Element Method, Solid Mechanics, Fracture Mechanics, Structural Dynamics, Numerical Analysis.

National Institute of Technology, Rourkela, Odisha, M.Tech (Dual Degree) in Civil Engineering August 2018 – July 2019

- M.tech GPA: 9.84/10
- **M.Tech thesis title:** Neural network based approach for linear elastic analysis of asphalt pavements subjected to moving loads

National Institute of Technology, Rourkela, Odisha, B.Tech (Dual Degree) in Civil Engineering August 2014 – July 2018

- B.Tech GPA: 8.99/10

Sri Chaitanya Educational Institutions, Andhra Pradesh, Intermediate Education in Science August 2012 – July 2014

- Percentage: 96.8
- Board - Board of Intermediate Education, Andhra Pradesh

D.A.V Public School, Jharsuguda, Odisha,, Matriculation July 2012

- GPA: 10/10
- Board - Central Board Of Secondary Education

Publications

A robust virtual element method framework coupling phase-field and cohesive zone models for crack propagation in composite structures

Shubham Sharma, Ananth Ramaswamy

Composite Structures, 88(8), 081002. DOI: 10.1016/j.compstruct.2026.120081

Fine to coarse mesh transition in phase-field fracture simulations using the virtual element method

Shubham Sharma, Himanshu, Ananth Ramaswamy

Finite Elements in Analysis & Design, 249, 104371. DOI: 10.1016/j.finel.2025.104371

A Geometrically Inspired Model for Brittle Damage in Compressible Elastomers

Sanhita Das, *Shubham Sharma*, Ananth Ramaswamy, Debasish Roy, J. N. Reddy

Journal of Applied Mechanics, 88(8), 081002. DOI: 10.1115/1.4050620

A comparison of lowest order standard and stabilization-free virtual element method for phase-field fracture (Under preparation)

Shubham Sharma, Ananth Ramaswamy

Conferences

Modelling of Crack Propagation in Finite Thickness Brittle Adhesive Layers , XVII International Conference on Computational Plasticity. Fundamentals and Applications. 5-7 September, 2023, Barcelona (Spain)

Projects

Virtual element methods for phase field fracture Ph.D Candidacy

- Developed a robust **Virtual Element Method (VEM)** framework for **phase field fracture** modeling of homogeneous and composite materials.
- Reduced the **computational time** by up to **60 percent** in crack propagation simulations using a novel **mesh transition strategy**.
- Implemented VEM in a commercial FE software **ABAQUS** using **user subroutine (UEL)** .
- Generated **non-matching, voronoi and non-convex meshes** using **MATLAB**.

Modeling of brittle damage in rubbery polymers Ph.D Candidacy

- Incorporated **material and geometric non-linearity** in an in-house developed damage model to simulate brittle crack propagation in a **rubbery polymer**, validated the simulation results with experimental data.
- Wrote an entire non-linear FEM solver in **MATLAB** to implement the damage model.
- Reduced the computational time by 7 times by employing the **parallel programming** capabilities of MATLAB.

Modeling of crack propagation in finite thickness three-dimensional adhesive layers Ph.D Candidacy (ISRO funded Project)

- Incorporated a **3d phase field fracture model** using **user subroutines (UEL)** in **ABAQUS** for simulating three-dimensional crack propagation in an adhesive layer and validated the simulation results with the experimental data given by the ISRO review team.
- Prepared quarterly reports and gave presentations to the ISRO review team.

Neural network based approach for linear elastic analysis of asphalt pavements subjected to moving loads Master's Thesis

- Developed an **Artificial Neural Network (ANN)** architecture to get the critical strains in a pavement section. The developed ANN architecture successfully predicted the correct strains on the testing datasets, thus eliminating the need for conventional 3d FEM linear elastic simulations.
- Used neural network toolbox of **MATLAB** to train the network.
- Wrote **python scripts** to automate the process of generating training datasets from ABAQUS for a given range of parameters and **user subroutine DLOAD** in **ABAQUS** to simulate the moving load.

Work Experience

Senior Research Engineer (Engineering Software), SST India Pvt. Ltd. Bengaluru July 2025 - Present

- Research and Development of the pipe stress analysis software **CAEPIPE**
- Development of a cloud-based flow analysis software.

Teaching Assistant, for the course on Solid Mechanics (Class strength - 100) August-December 2021

- Took doubt-clearing sessions for the class twice a week.

Summer Intern, ModRoof, Ahmedabad, India May-July 2017

- Improved the flexural properties of the bare cardboard panels that the company manufactures.
- Collaborated with a fellow intern in designing steel trusses of span ranging from 6 ft to 20 ft.

Winter Intern, South Eastern Railways, Sundergarh Zone, India December 2016

- Got exposure to the various works of the construction division of Indian Railways, such as the fabrication of steel girders of span 45.7 m and earthworks involved during the construction of embankments.

Achievements

- **2019-2023:** Awarded ISRO fellowship for pursuing PhD in IISc.
- **2019:** Topped the class of 60 students in the course of Finite Element Method (FEM).
- **2018 - 2019:** Secured 10 out of 10 GPA in the final year of NIT Rourkela.
- **2018:** MHRD fellowship for qualifying GATE.
- **2011:** awarded 'Distinction' in Mathematics in an international assessment test conducted by The University Of New South Wales, Sydney, Australia.
- **Before 2011:** Won district-level essay writing competitions.

Technical skills

Coding languages: FORTRAN 77, MATLAB, Python, C + + , \LaTeX

Commercial FEM Software: ABAQUS

Referees

Prof. Ananth Ramaswamy

Professor & Chairman, Department of Civil Engineering
Indian Institute of Science (IISc), Bangalore, India
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Prof. Debasish Roy

Professor, Department of Civil Engineering
Indian Institute of Science (IISc), Bangalore, India
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Prof. Narayan Sundaram

Associate Professor, Department of Civil Engineering
Indian Institute of Science (IISc), Bangalore, India
Email: nsundaram@iisc.ac.in