

## Education

- **Indian Institute of Technology, Madras** Chennai, India  
Master of Science in Aerospace Engineering; CGPA : 8.56/10 Jan'16 – Present
  - Thesis Title: *Multiscale Modelling of Damage in UD Composites*
- **Uttar Pradesh Technical University, Lucknow** Lucknow, India  
B.Tech in Mechanical Engineering; Percentage: 77.58% Jul'10 – Jun'14
  - Project Title: *Analysis and Experimental study of Hovercraft*

## Research Experience

- **Research Assistant, Department of Aerospace Engineering** Chennai, India  
**Advisor: Prof. Shantanu S. Mulay, IIT, Madras** Jan'16 – Present
  - Computational Homogenization of UDL RVE of different Fibre-Volume fractions.
  - Determination of Existence of RVE in Elastic, Hardening and Softening regime
  - Micromechanical Analysis of Effect of the Fibre-Volume fraction on Fracture Toughness of Composite.
  - Development of Abaqus/Explicit VUMAT User Subroutine for the study of Softening behaviour of RVE
  - Nonlocal Formulation and Implementation of Continuum Damage Model.

## Journal Publications

- **Paramveer Sharma, Shantanu S. Mulay (2018), Damage Modelling of Unidirectional Laminated Composite, *Mechanics of Advanced Materials and Structures*, (Accepted)**

## Key Projects

- **Implementation of Integral type Non-Local Explicit Damage model** IIT Madras  
*Part of MS Project, Prof. Shantanu S. Mulay* May'18 – June'18
  - Unique Method has been developed for the implementation of Non-local damage in **Abaqus/Explicit(VUMAT)**, Since there is no in-built process for non-local implementation in Abaqus®
  - Softening behaviour of matrix was simulated, using this Non-Local damage model, and results obtained were free from the any pathological mesh sensitivity
- **Vectorized User Fortran Code for the Lemaitre Damage model** IIT Madras  
*Part of ISRO Sponsored project, Prof. Shantanu S. Mulay* Nov'17 – Jan'18
  - A fast, single equation based stress integration algorithm, for the Lemaitre ductile damage model, has been executed in Abaqus User Fortran code VUMAT.
  - Results obtained from the above implementation were used for RVE determination, in the softening phase, using **failure zone averaging scheme**
- **Phase field model of thermally induced solid-solid phase transitions** IIT Madras  
*ED5053, Mechanics of Materials with Microstructures, Prof. Srikanth Vedantam* Aug'17 – Nov'17
  - Developed the 1-D phase field model for the material undergoes thermally induced solid-solid phase transitions between two distinct phases, using the **Fried-Gurtin approach**.
  - Derived the constitutive equations which were consistent with the Clausius-Duhem Inequality
  - Specialized the governing equations for modeling the **effect of inter-facial resistance** during phase transitions
- **Building GUI based Custom Plug-In in Abaqus/CAE Using Python** IIT Madras  
*Part of MS Project, Prof. Shantanu S. Mulay* Jun'17– Jul'17
  - Developed the Unique Plug-in titled '**RVE Homogenization**' using **Python**
  - Plug-In is capable to **fully automate** the process from Model Database(MDB) creation to Output Database (ODB) generation and then complete stiffness matrix computation.

- It takes inputs such as model information and individual material properties which further used to compute the homogenized properties

### • **Molecular Dynamics Simulation of Plate with hole**

IIT Madras

*MMXXXX, Multiscale Modelling of Materials, Prof. Anand K Kanjarla*

Aug'16 – Nov'16

- Molecular Dynamics simulation of Ni FCC Crystal was carried out to study the stress/strain distribution in front of propagating crack, using LAMMPS (A Open Source Molecular Dynamics Code)
- Shrink wrapped (Non-Periodic) and Periodic type BCs was used to Ni FCC box containing small central crack.
- Minimization of energy was done by conjugate gradient algorithm and using NVE ensemble the system iteratively brought to desired temperature. Pair potential used for the system was Ni99.eam.alloy

### • **Delamination at interfaces using Cohesive Zone Elements**

IIT Madras

*MMXXXX, Multiscale Modelling of Materials, Prof. Anand K Kanjarla*

Aug'16 – Nov'16

- The Delamination at interface of double cantilever model of bi-material was modelled by placing the layer of cohesive elements of negligible thickness
- Max stress based traction-separation laws were used to define the material behaviour of cohesive elements
- Fracture toughness and stress-strain response after the ultimate stress (delamination onset) were obtained

## Positions of Responsibility

### • **Founder, Royal Mechanical Buzz**

Chennai, India

#### • **A Mechanical Engg. Students Community Blog**

Jul'12 – Present

- Developed a blog in 2012 titled 'Royal Mechanical Buzz'. It was the Open Community forum type blog. I earned \$ 2100 US Dollar in **Google AdSense Program** within 1.2 years through the blog. Within a small span of time, it has reached 1000 Online Subscribers.
- Currently, it has 2078 Email Subscriptions and around 100 G+ Followers. The aim was for solving general Problem and conducting the live Online test, involving Mechanical Engg. domain

### • **Team Member, CGBS IIT Madras**

Chennai, India

#### • **Center For Innovation (CFI), IIT Madras**

Jan'16 – Jun'18

- **Cargo Ground Build-up System (CGBS)**, a University Project funded by **Lockhead Martin**
- CGBS is an air transportable, remote operated cargo handling vehicle designed for the Indian Air Force's Hercules C-130 aircraft to enable offloading of the cargo at remote locations
- Handle the various tasks such as Structural Components Design, validation of results, Axle design parameter identification etc. The main task was the design of a full-fledged chassis of vehicle with the minimum weight that can cable to sustain cargo weight, subject to various static and dynamic load.

### • **Co-Ordinator, Placement**

Chennai, India

#### • **Placement Team 2018**

Aug'18 – Present

- Coordinated with students and companies to organize and manage campus placements at IIT Madras for December 2018
- Helped in organizing the tests and interviews smoothly before and during placement season in 2018 – 19

## Scholastic Achievements

- **Student Innovator of the Year 2017:** As a Part of CGBS IIT Madras, The team has won the Student Innovator Award of the Year 2017 at IATIA 2017 Awards Ceremony, organized by **Auto Tech Review, Springer India**, and awarded the monetary fund for the project support
- **HTRA:** Received HTRA (Research Assistantship) for the entire duration of M.S. Degree
- **Second Topper:** Achieved the 2nd Position in the institute, during Undergraduate programme
- **GATE:** Percentile of 96 in Graduate Aptitude Test in Engineering (GATE) 2015

## Course Work

- **Key Courses:** Continuum Damage Mechanics, Multiscale Modelling of Materials, Engineering Plasticity, Mechanics of Materials with Microstructures, Elasticity, Continuum Mechanics, Composite Structures, Mechanics of Damage Tolerance, Aerospace Structures

- **Short term Course:** GIAN Course on 'Mechanics of Fracture', conducted by Prof. Krishnaswamy Ravichandar, University of Texas at Austin, USA and Dr. K. Ramesh, IIT Madras
- **Short Audit Course:** Audited the course 'Machine learning' by Andrew Ng on Coursera

### Relevant Skills

- **Scientific Software's:** Abaqus/CAE (UMAT & VUMAT), Solidworks, Ansys, LAMMPS
- **Programming:** C, Fortran, Matlab, Python (numpy, pandas, scipy, sympy, tensorflow, tkinter)
- **Web/Typography:** HTML, CSS, L<sup>A</sup>T<sub>E</sub>X, Microsoft Office Suite
- **Operating Systems:** Proficient in Windows and Linux OS

### Extra Curricular

- **Inter-Hostel:** Represented the Hostel in Inter Hostel Tennis Tournament 2017
- **International Day of Yoga:** Attended and Participated in International Day of Yoga, an event organised by Dean of Students, IIT Madras
- **TensorFlow Workshop:** Attended the Workshop on "TensorFlow", An open source machine learning framework, organised by Research Affairs Council, IIT Madras