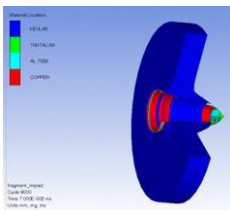


### About Us

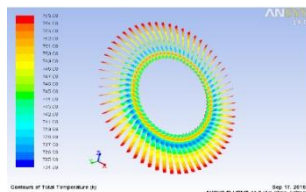
**Engineering Mechanics**, a branch of Applied Mechanics, focuses on research and analysis of problems in the broad areas of Solid Mechanics, Fluid Mechanics and Material Science. The major areas of expertise involve Linear and Nonlinear elasticity, Composite materials, Impact mechanics, Computational mechanics, Turbulence modeling to name a few. Students of the department are equipped to deal with wide range of technical and on field challenges through the experience that they gain from the research as well as industrially oriented projects. The research and project works are intended at giving thrust to the development in the areas of:

#### Solid Mechanics



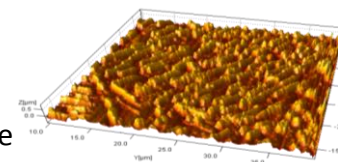
- Dynamics and Vibration
- Nonlinear Finite Element Analysis
- Light Weight Structural Materials
- Failure Analysis

#### Fluid Mechanics



- Turbulence Studies
- Computational Fluid Dynamics
- Pipeline Engineering
- Aerodynamic Design of structure

#### Material Science



- Nano Materials
- Metal Foams
- Crystal Plasticity
- Alloy Design

### Important Courses

- |   |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li>✓ Finite Element Analysis</li> <li>✓ Theory of Plates and Shells</li> <li>✓ Applied Computational Methods</li> </ul> | <ul style="list-style-type: none"> <li>✓ Computational Fluid Dynamics</li> <li>✓ Turbulent Shear Flows</li> <li>✓ Advanced fluid dynamics</li> </ul> | <ul style="list-style-type: none"> <li>✓ Fracture Mechanics</li> <li>✓ Failure Analysis and Prevention</li> <li>✓ Mechanics of composites</li> </ul> |
|---|--|--|

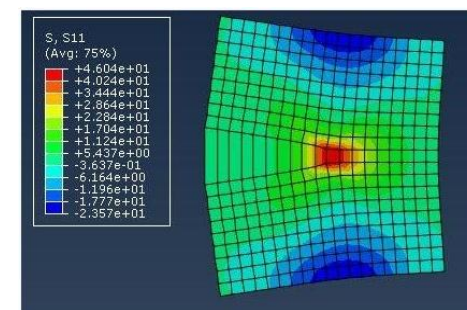
### Some of the On-going Projects by MTech Students

#### A. Computational Modelling and Analysis using Self-generated code

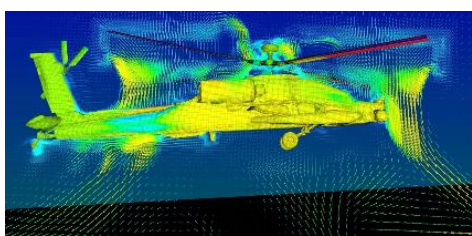
Involves numerical and analytical modelling and analysis of structural solid and fluid problems. These projects include coding using languages such as **MATLAB, FORTRAN, C++, Python**.

Some of the ongoing projects are :

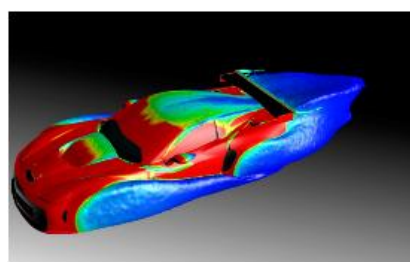
- ✓ Buckling and Dynamic analysis of Composite Shells.
- ✓ Fracture analysis of Functionally Graded Material plates using XFEM.
- ✓ Constitutive modelling of Biomaterials, Smart materials and Polymers.
- ✓ Study of heat enhancement through micro -channels.



Stress Analysis of fractured FGM plate using X-Finite Element Method



Down washing effect in a helicopter



Pressure Distribution around a moving car

#### B. Simulation using commercial FEA and CFD packages

Commercially available packages such as **ABAQUS, ANSYS, COMSOL, GAMBIT, Fluent CFX** etc. are used for simulation of specialised problems.

Major ongoing works include:

- ✓ Modelling of turbulent exchanges.
- ✓ Low velocity impact on composites.
- ✓ Stress analysis of dislocated bone.
- ✓ Grain bond detection in snow to predict avalanche.

#### C. Experimental Analysis

Involve design of experimental set up and investigation of different problems related to solids, fluids and material science. Through these projects, students gain hands on experience of instruments like **PIV, DIC, UTM, SEM, Wind tunnel** to name a few.

The ongoing projects involving experimental analysis are :

- ✓ Fabrication and testing of Aluminium composite
- ✓ Design and analysis of experiments using sudden accelerating system
- ✓ Experimental models for Lamb wave based structural health monitoring.



Scanning Electron Microscope(SEM) image of Nanoscratch