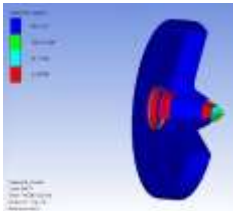


### About Us

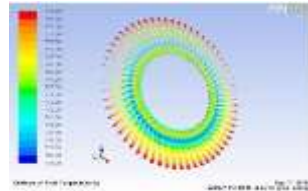
Engineering Mechanics, a branch of Applied Mechanics, focuses on research and analysis of problems in the broad areas of Solid Mechanics, Fluid Mechanics and Material Science. The major areas of expertise involve Linear and Nonlinear elasticity, Composite materials, Impact mechanics, Computational mechanics,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

#### Solid Mechanics



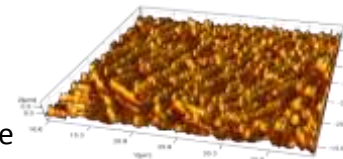
- Dynamics and Vibration
- Nonlinear Finite Element Analysis
- Light Weight Structural Materials
- Failure Analysis

#### 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

#### SOLID MECHANICS

- ✓ Finite Element Analysis
- ✓ Theory of Plates and Shells
- ✓ Advanced Dynamics
- ✓ Applied Computational Methods

#### FLUID MECHANICS

- ✓ Computational Fluid Dynamics
- ✓ Advanced Fluid Dynamics
- ✓ Turbulence & its Modelling
- ✓ Turbulent Shear Flows

#### MATERIAL SCIENCE

- ✓ Fracture Mechanics
- ✓ Failure Analysis and Prevention
- ✓ Mechanics of Composites
- ✓ Props. & Sel. of Engg. Materials

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

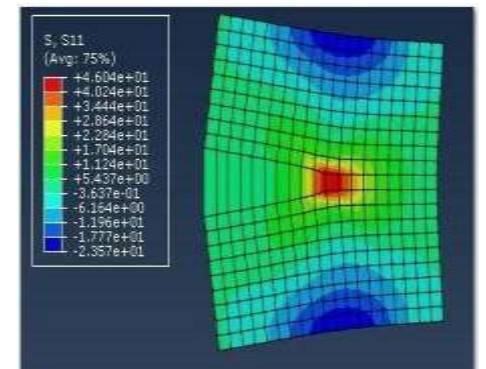
#### A. Computational Modelling and Analysis using in-house code

Involves numerical and analytical modelling and analysis of structural solid and fluid problems.

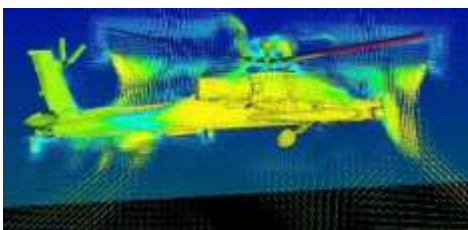
These projects include coding using languages such as **MATLAB, FORTRAN and C++**.

Some of the ongoing projects are:

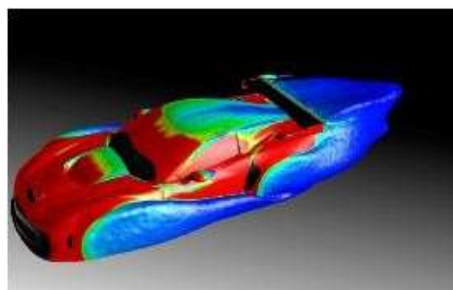
- ✓ Nonlinear Finite Element Analysis of Human Skull and Knee Ligament
- ✓ Fracture analysis of Functionally Graded Material plates using XFEM.
- ✓ Constitutive modelling of Biomaterials, Smart materials and Polymers.
- ✓ Study of Rayleigh Benard Convection in shear enclosure.



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:

- ✓ Flow analysis for drag reduction using CFD.
- ✓ CFD analysis of crystal growth process.
- ✓ Stress analysis of dislocated bone.
- ✓ Soft tissue modelling in ABAQUS and ANSYS.

#### C. Experimental Analysis

Involves 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:

- ✓ Monte Carlo simulations of PIV and error analysis.
- ✓ Impact response of composite riser.
- ✓ Tensile testing of human knee ligament (ACL & PCL).
- ✓ Lüder band formation in mild steel.



Scanning Electron Microscope (SEM) image of Nanoscratch