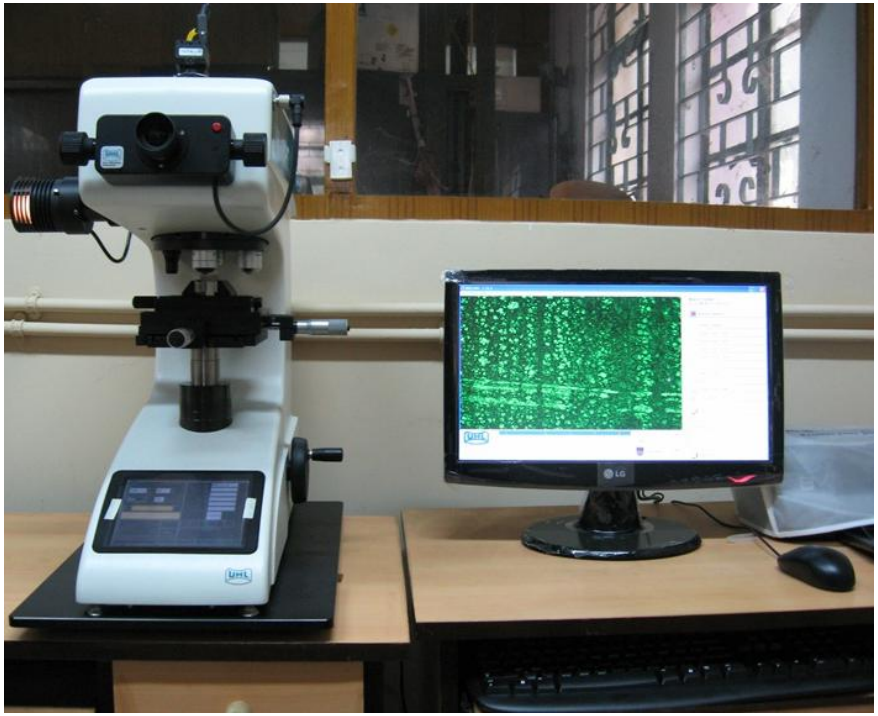
Tribology

- Contact Mechanics
- Tribology of Electroless Nickel Coatings
- Tribology of FRP Composites
- Roughness Characterization and Modelling
- Friction, Wear and Adhesion Modelling
- Fractal characterization of surfaces



Attached with: M/C Elements lab
Physical Location: M/C Elements lab, ME Department (Gr. Floor)
No. of Faculty involved: 3
PhD completed: 05 PhD ongoing: 05 PG Thesis completed: 22 PG Thesis ongoing:01
Projects completed: 08 Projects ongoing: 04
Funding agencies: DST, UGC, TEQIP
Publications – Journal: 118 Conference: 124 Cumulative citation: 678

Fracture , Fatigue and Deformation Characterization

Material Characterization through simulation and experimentation for

- Brittle and ductile fracture
- Low cycle and high cycle fatigue
- Uniaxial and multi axial fatigue and ratcheting
- Low temperature fracture toughness and Master Curve
- High temperature deformation and creep
- Deformation at high strain rate
- Fracture at high strain rate

1 Cryo-chamber 2 Controller 3 Operator panel

4 Support computer 5 Liquid nitrogen cylinder

6 Temperature indicator.

Attached with: Fracture Fatigue and Damage Laboratory

Physical Location: ME Department (Gr. Floor)

No. of Faculty involved: 03

PhD completed: 05 PhD ongoing: 04 PG Thesis completed: 18 PG Thesis ongoing: 02

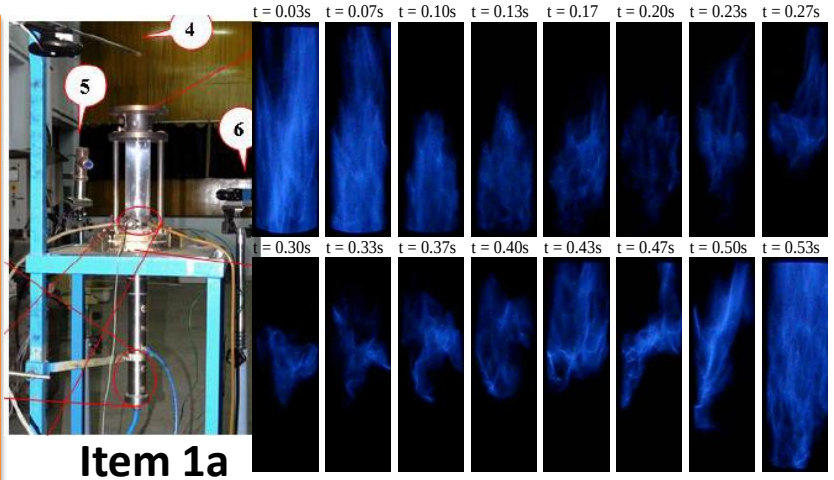
Projects completed: 06 Projects ongoing: 02

Funding agencies: BARC, BRNS, MHRD

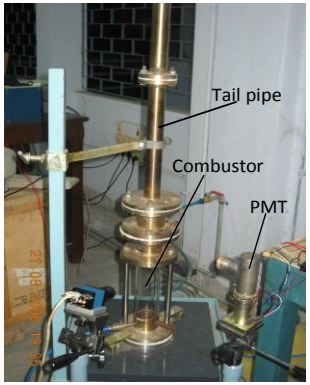
Publications – Journal: 25 Conference: 20 Cumulative citation: 45

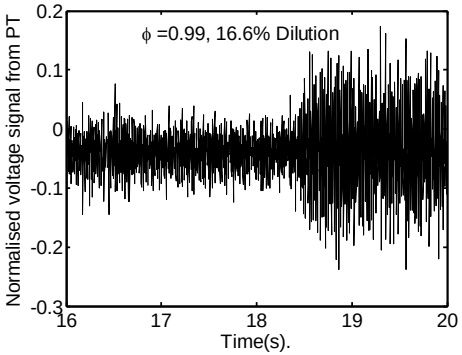
Combustion and Reacting Flow

1. Combustion Dynamics
   a. Lean Blowout Detection and Control in Gas Turbine Combustors
   b. Nonlinear Dynamics of Pulse Combustors
2. Atomization and Sprays
   a. Spray Formation
   b. Droplet and Spray Combustion
3. Structure & Propagation of Partially Premixed Flames
4. Combustion Synthesis of Nanoparticles

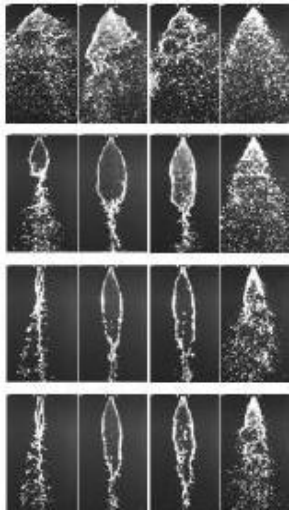


Item 1a





Item 1b



Item 2

Physical Location: Mechanical Systems and Control Lab (Hydraulics Lab)

No. of Faculty involved: 4+2 (Power Engg)

PhD completed: 4 PhD ongoing: 4 PG Thesis completed: 11 PG Thesis ongoing: 1

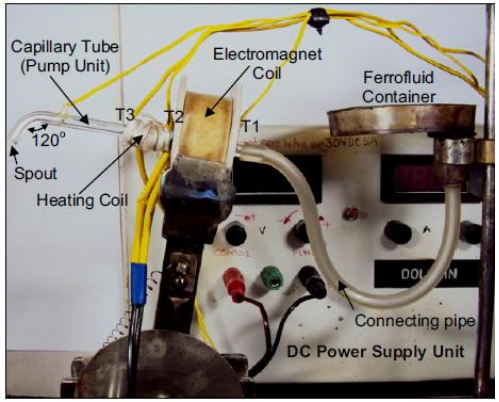
Projects completed: 4 Projects ongoing: 3

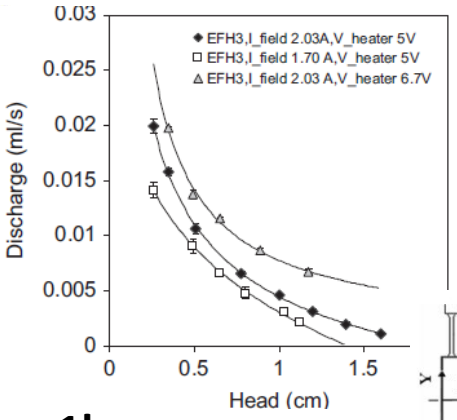
Funding agencies: DRDO, CSIR, ISRO, GTRE

Publications – Journal: 46 Conference: 71 Cumulative citation: 204

Heat Transfer

1. Thermomagnetic Convection
   a. Microelectronic Cooling
   b. Thermomagnetic Pump
2. Jet Impingement Cooling
   a. Cooling Rate
   b. Phase Transformation
3. Natural Convection
4. Heat Transfer for Nano Fluid





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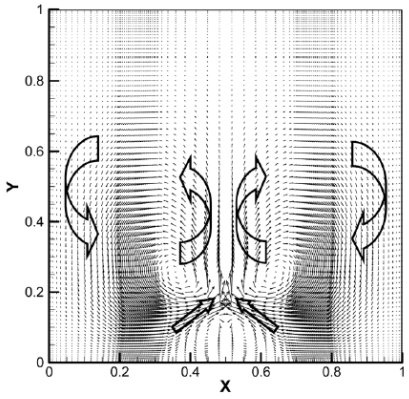
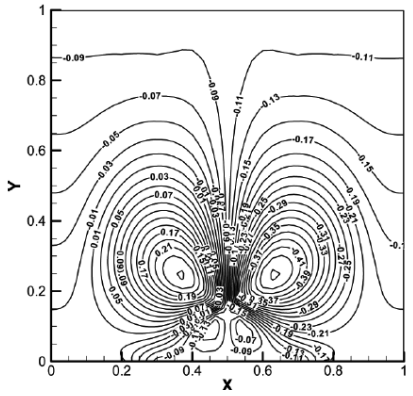
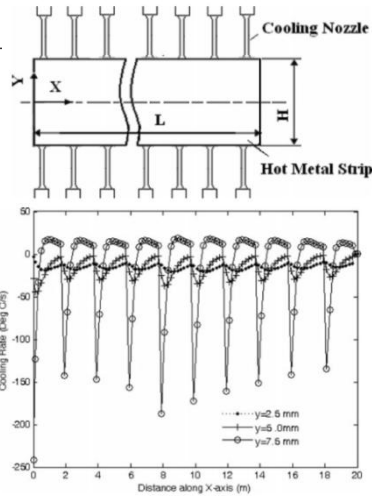




Item 1a



Item 2

Physical Location: HP Lab, Power Engg Deptt

No. of Faculty involved: 6+2 (Power Engg)

PhD completed: 6 PhD ongoing: 1 PG Thesis completed: 5

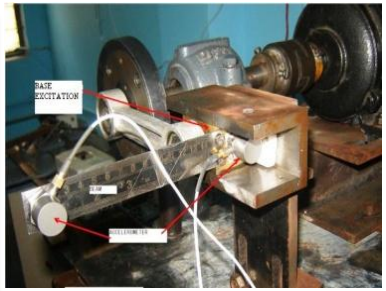
Projects completed: 3

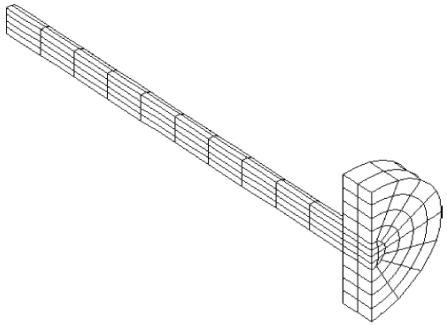
Funding agencies: BRNS, UGC,AERB

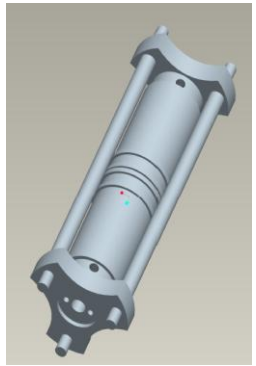
Publications – Journal: 41 Conference: 24 Cumulative citation: 109

Dynamics & Control-Experiment, FEM

Penning Trap – Simulation & Manufacturing
Rotor dynamics – conventional & 3D
FEM, precessing & nutating rotors, viscoelastic rotors, experiments
Structural dynamics & control – Eddy current damping, piezoelectric damper, magnetic actuation, modal analysis
Storage modulus and loss coefficient of viscoelastic materials
Motion control using servomotors
Geometrically and material nonlinearity analysis







Attached with: Dynamics Lab Physical Location: Ground floor, ME building
No. of Faculty involved: 4
PhD completed: 2 PhD ongoing: 2 PG Thesis completed: 10 PG Thesis ongoing:2
Projects completed: 2 Projects ongoing: 1
Funding agencies: AICTE, DST, DAE
Publications – Journal: 10 Conference:4

Structural Mechanics & CAD

Computational and experimental analysis for design of some structural members and mechanical components are considered. The numerical solution of the problem is derived from variational method, using the appropriate energy functional. Some of the different types of design problems, results obtained from the analysis and the complicating effects considered, are shown in adjoining tables. In many cases experimental work is also carried out for the purpose of validation.

Design problem
Beam/Bar/ Spring / etc.
Plate/Skew/ Stiffened/ ..
Disk/Gear/..
Various B.C. / geometry/ ..
Transverse/ In-plane/ ..
CAD

Type of Analysis
Stress/ Deformation/ Limit speed/ etc.
Vibration frequency/ Mode shape/ Backbone curve/ etc.
Critical load/ Stability diagram/ etc.

Complicating effect
Geometric non-linearity
Material non-linearity
Non-linear vibration
Thermal effects
FGM
ULA

Physical Location: M/C Elements lab, ME Department (Gr. Floor)
No. of Faculty involved: 1+3
PhD completed: (1+2) PhD ongoing: 1 PG Thesis completed: 9
Projects completed: 1
Funding agencies: AICTE
Publications – Journal: 22 Conference: 25 Cumulative citation: 180

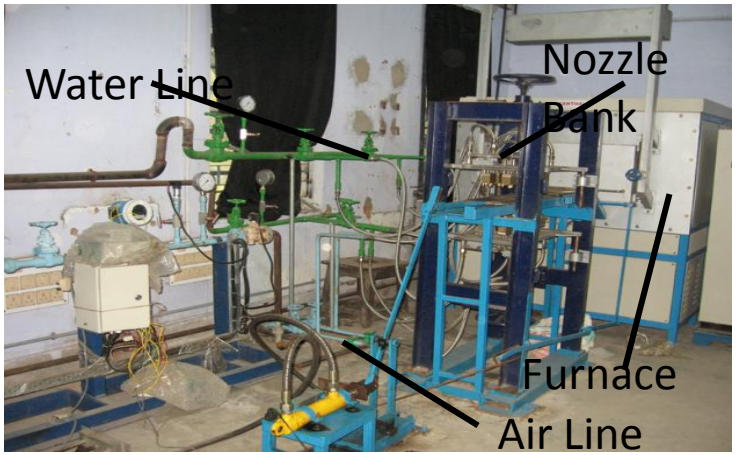
Motion Control Systems

- **Working as a group for last 20years**
- **Collaborative Design Analysis by Simulation –pump, measuring machine, 6DOF simulator**
- **Design and Installation of Laboratory Set-up –electrohydraulic and electrical actuation systems for single and multi DOF motion with different loading arrangements**
- **Real-Time Controller Design – feedforward, fuzzy, neural and sliding-mode controllers with optimizers and adaptive structures for motion and force control**

Attached with: Mechanical Engineering Department, Electrical Engineering Department;
Physical Location: Mechanical Systems & Control Lab. Hydraulics Lab. Building, M.E. Dept.
No. of Faculty involved: 5
PhD completed: 5 PhD ongoing: 8 PG Thesis completed: 15 PG Thesis ongoing: 1
Projects completed: 13 Projects ongoing: 5
Funding agencies: AR&DB,DRDO, RCI,HAL (Lucknow), VSSC, NSTL, ITR (Chandipur), Tata Steel
Publications – Journal: 7 Conference: 20 Cumulative citation: 36

Multiphase Flow

1. Spray Impingement Ultra-Fast Cooling (UFC) of Moving Metal Plates
2. Fuel-Coolant Interaction
   a. Code Development
   b. Lab-scale Experiment
3. Film Boiling on Submerged Surfaces
   a. Modeling
   b. Experiments
4. Dynamics and Control of Natural Circulation Loops



Item 1

Item 2

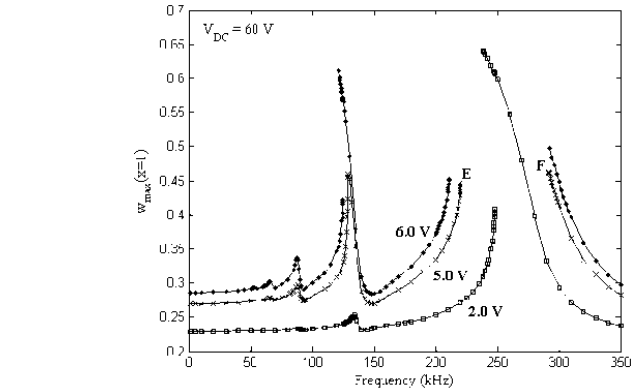
Item 3

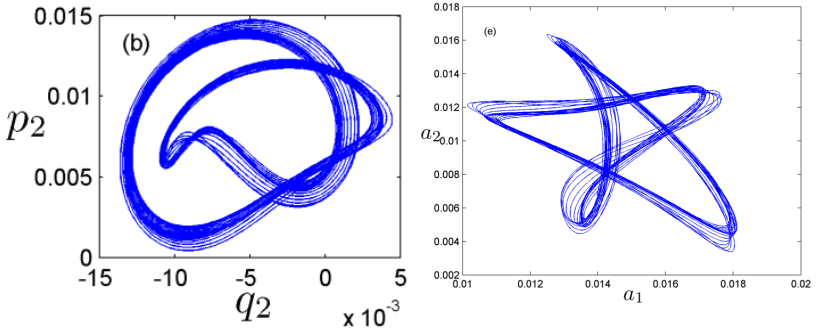
Item 4

Physical Location: Mechanical Systems and Control Lab (Hydraulics Lab)
No. of Faculty involved: 6
PhD completed: 3 PhD ongoing: PG Thesis completed: 7 PG Thesis ongoing: 2
Projects completed: 5
Funding agencies: BARC, BRNS, Tata Steel
Publications – Journal: 7 Conference: 24 Cumulative citation: 25

Vibration

- Large amplitude vibration of rotating blades
- Non-linear modelling and simulation of beam having edge cracks
- Detection of crack size and its location in beam like structure using ANN, Wavelet Transform and Fractal dimension Analysis
- Nonlinear dynamics of travelling beam with parametric and internal resonances- detection of quasi-periodic and chaotic behaviour





Attached with: Machine Element Laboratory

Physical Location: Mechanical Engg. Dept (gr. Floor)

No. of Faculty involved: 1

PhD completed: 1 PhD ongoing: 5 PG Thesis completed: 05 PG Thesis ongoing: 0

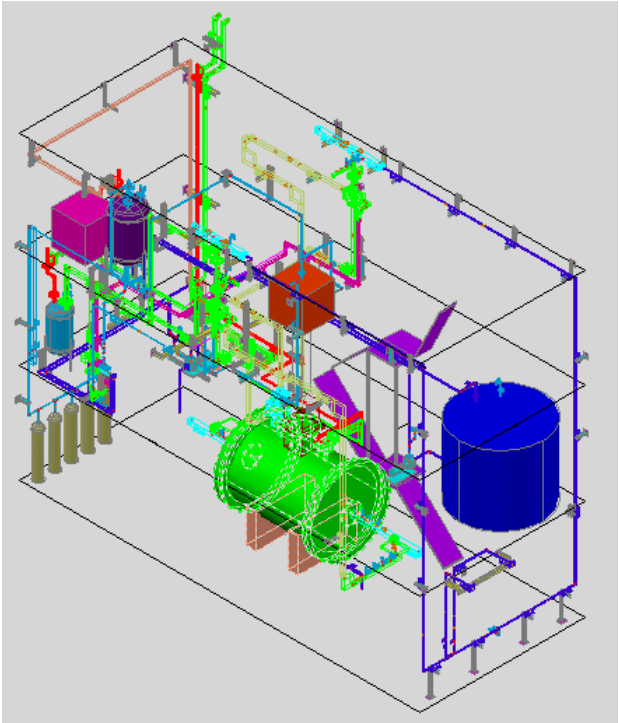
Projects completed: 2 (Not listed) Projects ongoing: 0

Funding agencies: AICTE

Publications – Journal: 18 Conference: 18

Integrated Test Facility for Safety Studies (ITFSS)

- An experimental facility that is being built up to study transiences during the simulated Nuclear Power Plant accident involving Header and Reactor Channel Blowdown
- This facility uses the already installed Augmented Leak Test Facility compressed liquid water generator at 90 bar pressure and 250^{o}C temperature



Attached with: Heat Power Laboratory, Mechanical Engineering Department
Physical Location: Heat Power Laboratory, Mechanical Engineering Department
No. of Faculty involved: 3
Projects ongoing: 1
Funding agencies: Bhabha Atomic Research Centre, Mumbai

Augmented Leak Test Facility (ALTF)

An experimental facility that is currently capable of measuring mass flow rate of compressed liquid water at Pressurized Heavy Water Reactor conditions (90 bar, 250^{o}C) through tight cracks on pipes of sizes DN80, DN100 and DN150. It has a Thermic Fluid Heating system, an arrangement to provide 3 point bending load on a 3 metre long pipe for help opening the tight crack and a nitrogen system to create pressure along with extensive safety and interlocking features.

Attached with: Heat Power Laboratory, Mechanical Engineering Department
Physical Location: Heat Power Laboratory, Mechanical Engineering Department
No. of Faculty involved: 7
PhD completed: PhD ongoing: 2 PG Thesis completed: 3 PG Thesis ongoing:
Projects completed: 4 Projects ongoing: Projects awaited: 1
Funding agencies: Board of Research in Nuclear Sciences (BRNS)
Publications – Journal: 1 Conference: 3

Computational Fluid Dynamics

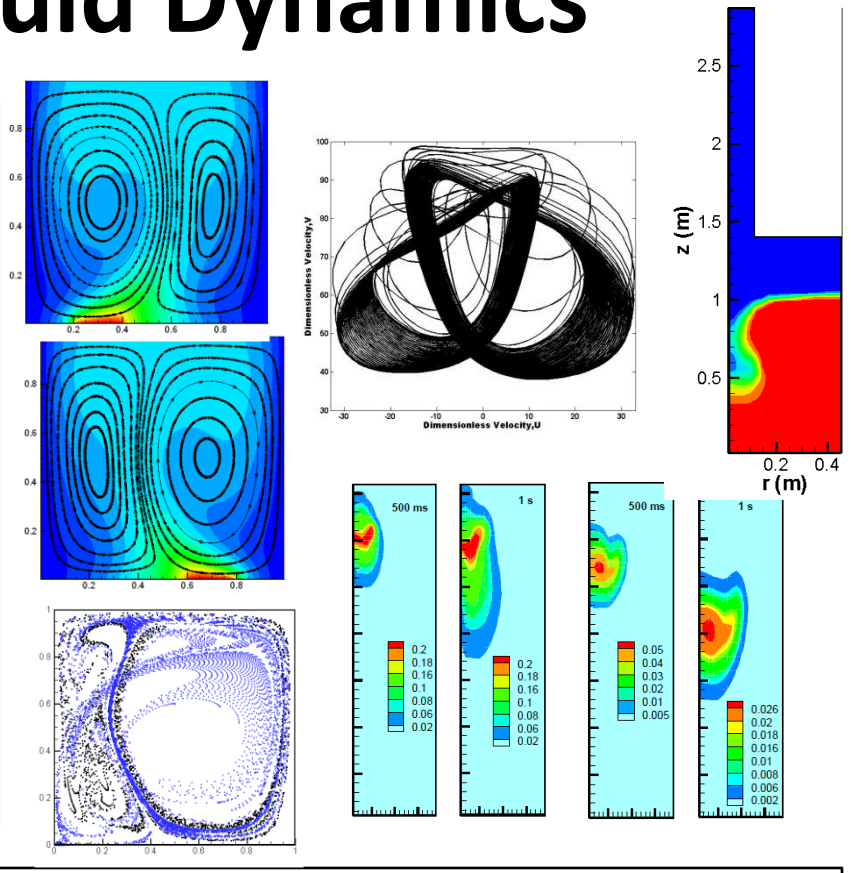
Present scenarios of indigenous code based studies:

Single Phase Flow

- Spool valve of HCS • Radial diffuser
- Natural/Mixed Convection in Enclosures
- Non-linear analysis• Porous Media • Nano-particles • MHD • Bio-fluid flow

Multiphase Flow

- Film-boiling • Fragmentation
- Fuel Coolant Interaction of nuclear reactor



Attached with: FM & HP

Physical Location: Hyd. Lab

No. of Faculty involved: 6

PG Thesis completed: 1

PG Thesis ongoing: 2

Projects completed: 1

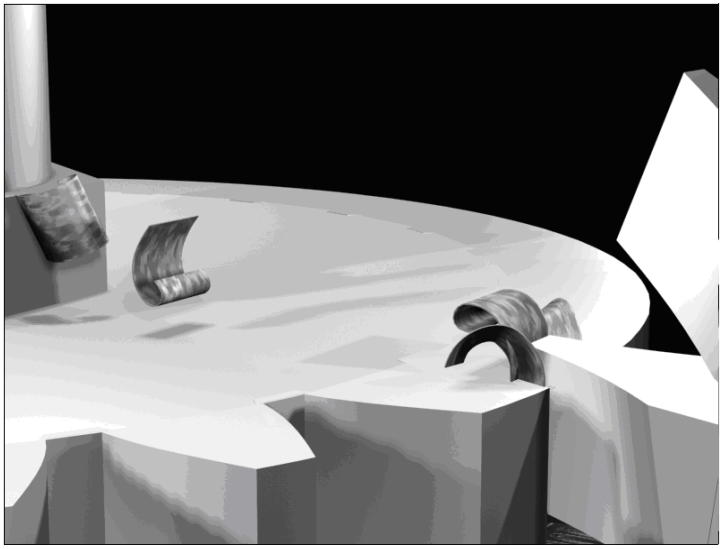
Funding agencies: BARC

Publications – Journal: 8

Conference: 20

Virtual Manufacturing

- Application of virtual manufacturing technique to various gear generation methods



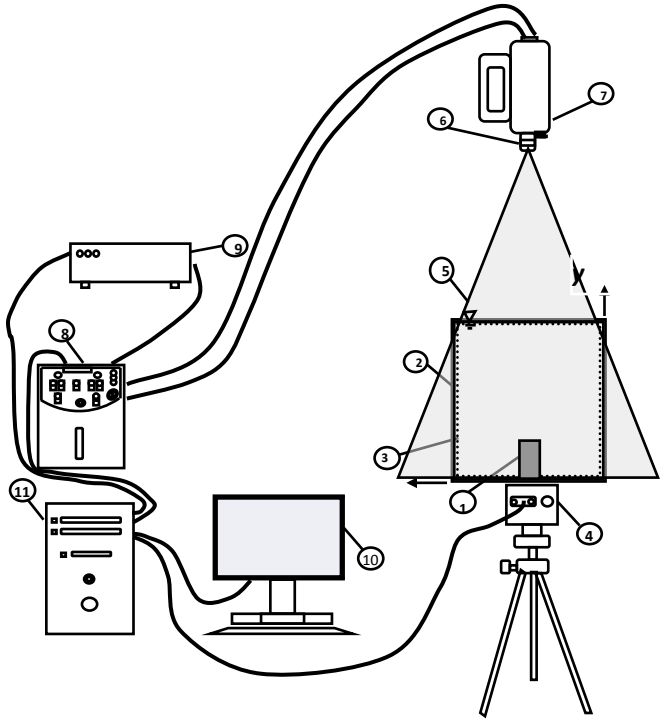
Attached with: Machine Element Laboratory

No. of Faculty involved: 1

PhD completed: 01 PG Thesis completed: 02

Fluid Flow and Heat Transfer Analysis using Experimental (PIV) and Numerical Techniques

Particle image velocimetry (PIV) is the newest technique in the field of fluid flow and heat transfer. PIV is an optical method of fluid visualization. An oil seed particle generator has been developed to generate seed particle to study the gas flow filed. Natural convection in a square enclosure with a hot source at different locations have been studied and analyzed experimentally and Numerical Techniques



Attached with: Hydraulics Laboratory

No. of Faculty involved: 2

PhD ongoing: 01 PG Thesis completed: 01

Publications – Journal: 02 Conference:03

Robotics

Analysis and synthesis

- of serial manipulator
- of 6-legged moving robot
- of optimized manipulator trajectory

Attached with: M/C elements Lab, M.E Department
No. of Faculty involved: 1
PG Thesis ongoing: 1
Projects ongoing: 1
Funding agencies: UPE II Scheme
Publications – Journal: 1 Conference: 3

Design and Optimization

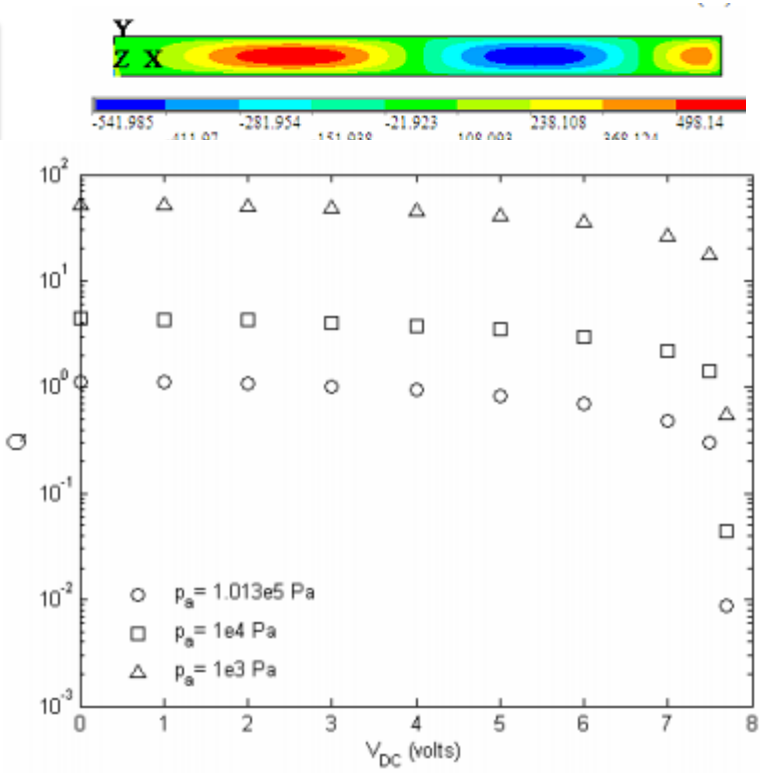
Design optimization

- of Cam motion curve
- of four bar and multi-bar linkage
- of flexible linkage
- Using Genetic Algorithm, PSO, DE, Simulated Annealing

Attached with: M/C elements Lab, M.E Department
No. of Faculty involved: 01
PhD completed: 01 PhD ongoing: 02 PG Thesis completed: 17 PG Thesis ongoing: 2
Projects completed: 2 Projects ongoing: 3
Funding agencies: RCI, ITR
Publications – Journal: 11 Conference: 25

MEMS

- Modelling and Simulation of MEMS devices



Attached with: Machine Element Laboratory

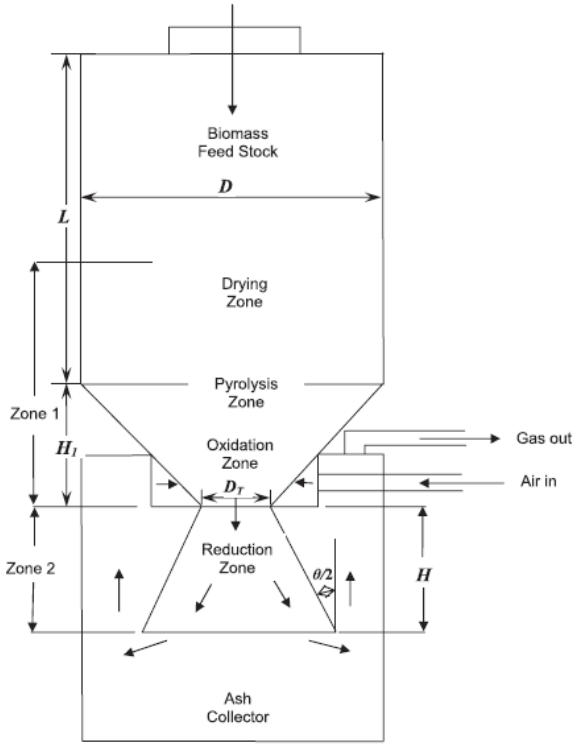
No. of Faculty involved: 1

PhD completed: 1

Publications – Journal: 04 Conference: -- 03

Modeling of Biomass Gasifiers

Thermodynamic modelling of Biomass Gasifiers are carried and validated against the experimental results. Parametric variations have been made to optimize the operating parameters as well as design parameters. Modelling of different gasifiers such as Down draft, Fluidized Bed gasifier and entrained flow gasifier have been considered. Performance analysis of downdraft gasifier with different biomass feed stocks have been made and discussed.



Attached with: Simulation Laboratory

Physical Location: JU Salt Lake Campus

No. of Faculty involved: 1+2

PhD ongoing: 02

Publications – Journal: 05 Conference: 02