

# Department of Aerospace Engineering

Research Topics from Faculty members interested  
in new PhD students

Admission Cycle : Nov/Dec - 2020



# Aerodynamics

# Prof. Avijit Chatterjee

Hiring this season?: **Yes**

Research Areas:

1. Computational Electromagnetics (CEM): Algorithm development and electromagnetic scattering in aerospace engineering
2. Aerospace configuration design involving CFD & CEM
3. Problems in aeroacoustics

URL to Lab Website / Profile: <https://www.aero.iitb.ac.in/~avijit/>

Primary nature of research project: Computational/Design

# Prof. Aniruddha Sinha

Hiring this season?: **Yes**

Research Areas:

1. Reduced-order modelling of aerodynamics
2. Aeroacoustics
3. Flow control

URL to Lab Website / Profile: <https://www.aero.iitb.ac.in/~aniruddha/>

Primary nature of research project: Theoretical/Computational

# Prof. Dhwanil Shukla

Hiring this season?: **Yes**

Research Areas:

1. Experimental Low-Speed Aerodynamics;
2. Rotorcraft Aerodynamics



URL to Lab Website / Profile: [https://www.aero.iitb.ac.in/exp\\_aero\\_lab](https://www.aero.iitb.ac.in/exp_aero_lab)

Primary nature of research project: Experimental

Useful skills/experience: Design and fabrication of electro-mechanical setups

# Prof. Prabhu Ramachandran



- Hiring this season? **Yes**
- Research Areas: Particle methods for continuum mechanics, scientific computing, parallel and high-performance computing (HPC)
- Projects available: development of high-level tools for HPC or of new algorithms for use in particle methods (SPH or meshless particle methods)
- Skills/experience: Good programming background, interest in mathematical physics and computer science
- More information: <https://www.aero.iitb.ac.in/~prabhu/>

# Prof. J. C. Mandal



- Hiring this season? Yes
- Research Areas: Development of novel Computational Fluid Dynamics algorithms for
  1. Incompressible flows involving Multiphase flows, Heat Transfer
  2. Compressible flows involving Hypersonic flows with real gas effect, All Mach number formulation
  3. Fluid-Structure Interactions
  4. Semi-analytic (Decomposition) Methods
- Nature of Research Projects: Theoretical/Computational
- Skill/Interest: C, C++ programming; Numerical methods; Mathematical Physics
- URL to Profile: <https://www.aero.iitb.ac.in/~mandal>

# Prof. Vineeth Nair

Hiring this season?: **Yes**

Research Areas:

1. Thermoacoustics
2. Aeroacoustics - **position open**
3. Flow visualization
4. Computation of reacting flows

URL to Lab Website / Profile:

<https://www.aero.iitb.ac.in/home/people/faculty/vineeth>

Primary nature of research project: Experimental



# Prof. Rajkumar S. Pant



Hiring this season?: **Yes**

Research Areas:

1. Aircraft Conceptual Design
2. Lighter-than-Air Systems

URL to Lab Website / Profile: <https://www.aero.iitb.ac.in/~rkpant/>

YouTube Channel: <https://www.youtube.com/LTASystemsLabIITBombay>

Primary nature of research project: Design, Experimental/Computational

# Dynamics and Control

# Prof. Arnab Maity



Hiring this season?: **Yes**

Research Areas:

1. Guidance, Navigation and Control of Aerospace Vehicles
2. Drone Delivery System and Unmanned Aerial Systems Traffic Management
3. Optimal and Adaptive Control
4. Control and Estimation of Distributed and Cyber Physical Systems
5. Fault Tolerant Control and Estimation, Fault Detection and Diagnosis

URL to Lab Website/ Profile: <https://www.aero.iitb.ac.in/home/people/faculty/arnab>

Primary nature of research project: Theoretical / Simulation

# Prof. Shashi Ranjan Kumar

Hiring this season?: **Yes**

Research Areas:

- Guidance and Control of Autonomous Vehicles
- Cooperative Active Aircraft Protection
- Consensus and Formation Control of Multi-Agent Systems
- Cooperative Control, Collision and Obstacle Avoidance, and Path Planning of UAVs

URL to Profile: <https://www.aero.iitb.ac.in/home/people/faculty/shashi>

Primary nature of research project: Theoretical/Computer Simulation

Useful skills/experience: Basic knowledge of control theory and solutions of ODE



# Propulsion

Prof. S.P. Mahulikar

<https://www.aero.iitb.ac.in/~spm/>

1 PhD Candidate in Sponsored Category (Min. Defense, Govt. of India)

Topic: Infrared Signature Studies of 5th Generation Stealth Aircraft

Nature of Research: Theoretical & Numerical

# Kowsik Bodi

Hiring this session? **Yes**

Projects available in:

1. High speed reacting flows
2. Hybrid (particle-fluid) codes for Plasma Propulsion
3. Laser propagation in a gas

URL to Lab website/profile: <https://www.aero.iitb.ac.in/~kbodi/>

Useful Skills/Experience: Numerical Methods, Programming experience  
(C++/Fortran)

# Hrishikesh Gadgil

Hiring this session? **Yes**

Projects available in:

1. Liquid atomization in engine combustors
2. Spray-acoustics interaction
3. Atomization of gel propellants (non-Newtonian liquids)
4. Secondary breakup and combustion of droplets

Primary nature of research project: Experimental and analytical

Useful Skills/Experience: Experimental methods, flow diagnostics



# Krishnendu Sinha

Hiring this session? **Yes**

Projects available in:

1. High-enthalpy flows
2. Shock-turbulence interaction
3. Heat transfer
4. Scramjet application



URL to Lab website/profile:

<https://www.aero.iitb.ac.in/~krish/>

Primary nature of research project: Computational and analytical

Useful Skills/Experience: Code development, CFD simulation

# Sudarshan Kumar

Hiring this session → YES



Project available

1. Flame speed measurement at high pressure and temperature conditions
2. Flameless combustion and its applications to gas turbines
3. Endothermic fuel development
4. Flame instabilities in micro-channels

Primary nature of work: Largely experimental and partly computational

Useful Skills/Experience: Experimental methods, flow diagnostics, Kinetic modeling, Image processing, Combustion modeling

URL: [www.aero.iitb.ac.in/~sudar](http://www.aero.iitb.ac.in/~sudar)

# Structures

# Prof. Susmita Naskar

Hiring this season?: Yes

Research Areas:

- Nanomechanics and Micromechanics of Materials (composites and multi-functional materials)
- Mechanics of Carbon- and Boron-Based Nanostructures
- Machine learning assisted material design for multi-scale analysis
- Additive Manufacturing of Materials: The Technology, Materials, Design
- Smart Materials and Structures; Flexoelectricity and Piezoelectricity

URL to Lab website/profile: <https://www.snaskar.com/>

Primary nature of research project: Computational and Experimental

Useful skills/experience: Solid mechanics, Finite element analysis



# Prof. Krishnendu Haldar

Hiring this season?: **Yes**

Research Areas:

1. Multiphysics (electromagnetic) coupling with solids
2. Continuum mechanics/nonlinear mechanics of solids
3. Nonlinear FE for coupled problem

URL to Lab Website / Profile: <https://haldarkrishnendu.wixsite.com/krishnendu>

Primary nature of research project: Theoretical/Computational

# Prof. Chandra Sekher Yerramalli

Hiring this season?: **Yes**

Research Areas : Currently looking for a student with interests in

1. Composite material mechanics - lightning strike simulation - conductive polymers - residual strength modeling - fracture of polymers

Google Scholar Link : <https://scholar.google.co.in/citations?user=36hicnUAAAAJ&hl=en>

URL to Lab Website / Profile: <https://iitb.irins.org/profile/59571>

Primary nature of research project: Modeling and Experimentation

Preferred Background : FEM, Exposure to experimental work and Composite materials, aptitude to learn independently