Dr. Aditi Sengupta

Assistant Professor
Department of Mechanical Engineering,
IIT (ISM) Dhanbad, Dhanbad,
Jharkhand, India 826004.

Email:aditi@iitism.ac.in
dolaaditi@gmail.com

Nationality: Indian

Employment Details

Position	Organization	Period of employment	Details of position held
Assistant Professor	Indian Institute of Technology (Indian School of Mines) Dhanbad	June, 2021 – present	Faculty position at the Department of Mechanical Engineering, IIT (ISM) Dhanbad involving research guidance, teaching, administrative work and sponsored research.
Visiting Assistant Professor	Indian Institute of Technology (Indian School of Mines) Dhanbad	October, 2020 – June, 2021	Visiting faculty position at the Department of Mechanical Engineering, IIT (ISM) Dhanbad involving research guidance and teaching.

Academic Qualifications

Year	Degree	Department	Specialization	Institution/University	CPI on 10-point scale
2015-2020	Ph.D.	Engineering	Energy and Fluids	University of Cambridge, Cambridge, CB2 1PZ, UK	N. A.
2011-2015	B. Tech.	Mechanical Engineering	N. A.	Manipal Institute of Technology, Karnataka, 576104, India	9.94/10

Awards, Achievements and Memberships

- Research internship through merit-based **Misra Undergraduate Award** in **McGill University**, Montreal, Canada- Summer 2013.
- Research internship in **Mechanical Engg.**, **IIT Kanpur** through **SURGE programme**–Summer 2014.
- **Gold medallist**, **Department of Mechanical Engineering**, Year 2011-2015, **Manipal Institute of Technology, Manipal.**
- **First recipient of Cambridge India Ramanujan Scholarship** through **Cambridge Trust**, **Univ. of Cambridge, UK** and **Department of Science and Technology, India**, 2015-2019 for PhD program in Dept. of Engineering, Univ. of Cambridge, UK.
- Completed courses on i) **Computational Fluid Dynamics** and ii) **Turbulence and Vortex Dynamics** with **first-class honours** in December 2015 and April 2016 from the **Department of Engineering, University of Cambridge.**
- **Review Editor** of **Frontiers in Aerospace Engineering (2021-present).**

Areas of Interest

• Turbulence, Transition and Receptivity	• Computational fluid dynamics
• Turbomachinery flows	• Global Spectral Analysis of Numerical Methods
• High Performance Computing	• Design and Analysis of High Accuracy Parallel Methods for Complex Geometries.
• Combustion	• Instability analysis, development of theories

Internships and Work Experiences

- Undergraduate research trainee at Department of Mechanical Engineering, McGill University, Montreal, Canada in May-July, 2013.
- Undergraduate research trainee at Department of Mechanical Engineering, IIT Kanpur, India in May-July, 2014 (SURGE Programme) and January-May, 2015 (Final Year Project).
- Undergraduate research trainee at HPCL, Department of Aerospace Engineering, IIT Kanpur, India in December, 2012 (publication [1]) and January to September, 2015.
- Postgraduate research scholar at Dyson Laboratory, Department of Engineering, University of Cambridge, UK October, 2015 - July, 2019.
- TA for course on "Computational Fluid Dynamics" Department of Engineering, University of Cambridge, UK October–December,2016.
- Poster presentation on "**On the influence of roughness and free-stream turbulence on separation induced transition**" at **UK Turbulence Consortium Meeting, Imperial College, London, UK September, 2017.**

- **Advanced Summer School** at **Central Institute of Mechanical Sciences (CISM), Udine, Italy, 21-25 May, 2018 on "High-Performance Computing of Big Data for Turbulence and Combustion" Lecturers: Prof. Thierry Poinsot (Director, CERFACS, Toulouse, France), Prof. G. Iaccarino (Stanford Univ., USA), Prof. Paul Tucker (Univ. of Cambridge, UK), Prof. Mejdi Azaiaez (Head, I2M, Univ. of Bordeaux, France) and Prof. T. K. Sengupta (HPCL, IIT Kanpur)**.
- Poster presentation on **Bypass Transition in Low Pressure Turbines** at **CISM, Udine, Italy Summer School.**
- Technical article on "**Advances in High Accuracy, High Performance Scientific Computing**" for **Indian Engineering Exports, Monthly Magazine, Vol. 13, Issue 3, June 2020**.
- Preparation of online material for NPTEL course **101104015** on "**Instability and Transition of Fluid Flows**" May-June, 2020.

PhD. Thesis

Title: **Numerical Investigation of Disturbance Environments in Low Pressure Turbines**
Thesis Supervisor: **Prof. Paul Tucker, University of Cambridge, Cambridge, UK**

Sponsored Projects

1. **National Supercomputing Mission, R&D Exascale: Exascale Computing of Compressible Rayleigh-Taylor Instability with A Novel Non-Overlapping Parallel Algorithm**. (2021 – 2023) Project value INR 2.109 Crores – **Co Investigator.**
2. **DST Start Up Research Grant**: **Role of Free Stream Excitation on the Separation-Induced Transition in Low Pressure Turbines Using an Accuracy-Preserving Parallel Algorithm. (2022-2024)** Project value INR 20 lakhs **– Principal Investigator**
3. **CEFIPRA: Data reduction and surrogate modelling of transition to turbulence of Rayleigh-Taylor instability data obtained by DNS.** (2023-2026) Project value INR 68.79 lakhs **– Principal Investigator.**
4. **National Supercomputing Mission, R&D Exascale: High accuracy computing of thermally-stratified free shear layers: Combined Kelvin-Helmholtz Rayleigh-Taylor instability.** (2023-2024) Project value INR 27, 48, 000 **– Principal Investigator.**
5. **Penn Global Convening Grant: Confronting the grand challenge of modelling environmental fluid flows**. (2024-2025) Project value USD 10,000 – **Principal Investigator.**

Invited Talks

1. **High-Performance Computing of Thermally Stratified Free Shear Layers: Rayleigh-Taylor and Kelvin-Helmholtz instabilities** – Department of Aerospace Engineering, Indian Institute of Technology Bombay on 24th September, 2022.
2. **Towards Exascale Computing of Compressible Hydrodynamic Instabilities** – GeM, Ecole Centrale de Nantes, France on 18th June 2024.

Technologies Developed

1. Patent on **"METHOD AND SYSTEM FOR OPTIMUM USAGE OF AMMONIA BY GENERATING POWER USING COUPLED HEAT EXCHANGER-COMBUSTOR".** Application number**: 202231069382,** Status**: Granted. [Indian Patent No. 513499].**

Refereed Journal Publications

h-index: 16, Citations: 562

Source: [Google scholar @ https://scholar.google.co.in/citations?user=j8qZNfkAAAAJ&hl=en]

With IIT (ISM) affiliation:

1. **[I. F. 4.98, CIT 0] Thermal optimization of shock-induced separation in a natural laminar airfoil operating at off-design conditions** – **A. Sengupta**, and N. Shandilya, *Physics of Fluids*, Special Collection: *K. R. Sreenivasan: A Tribute on the occasion of his 75th birthday*, **36(4)**, 046117, (2024). https://doi.org/10.1063/5.0202482

2. **[I. F. 4.98, CIT 1] Separation-induced transition on a T106A blade under low and elevated free stream turbulence** – **A. Sengupta**, N. Gupta and B. N. Ubald, *Physics of Fluids*, **36(2)**, 026119, (2024). https://doi.org/10.1063/5.0189358

3. **[I. F. 1.7, CIT 0] Modeling the co-combustion of bi-fuel blends in a drop tube furnace: A numerical approach –** S. Aich, B. K. Nandi, **A. Sengupta** and P. Sharma, *Proceedings of the Institution of Mechanical Engineers, Part A: Journal of Power and Energy*, 0(0), 1-15 (2024). https://doi.org/10.1177/09576509231225554

4. **[I. F. 2.902, CIT 0] Characterizing pulverized coal combustion for high-ash content Indian coal – A. Sengupta, S. K. Das, B. Nandi and P. Sharma**, *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects*, Accepted (2023).

5. **[I. F. 4.98, CIT 0] Compressibility effects on the flow past a T106A low pressure turbine cascade** – **A. Sengupta**, P. Sundaram, *Physics of Fluids*, **35(10)**, 106110, (2023). https://doi.org/10.1063/5.0172334

6. **[I. F. 4.98, CIT 0] Multi-layer Rayleigh-Taylor instability: Consequences for naturally occurring stratified mixing layers** – **A. Sengupta**, H. N. Ulloa, B. Joshi, *Physics of Fluids*, **35(10)**, 102110, (2023). https://doi.org/10.1063/5.0170319

7. **[I. F. 4.98, CIT 4] Exploring role of aspect ratio for compressible flow in a rectangular lid-driven cavity with a vertical temperature gradient** – B. Joshi, **A. Sengupta**, P. Sundaram, *Physics of Fluids*, **35(6)**, 066135, (2023). https://doi.org/10.1063/5.0155851

8. **[I.F. 3.17, CIT 3] Global spectral analysis: Review of numerical methods** — Pierre Sagaut, V.K. Suman, P. Sundaram, M.K. Rajpoot, Y.G. Bhumkar, S. Sengupta, **A. Sengupta**, T.K. Sengupta, *Comput. Fluids*, **261**:105915 (2023). https://doi.org/10.1016/j.compfluid.2023.105915

9. **[I.F. 4.98, CIT 1] Continuum perturbation field in quiescent ambience: Common foundation of flows and acoustics** – T. K. Sengupta, S. K. Jha, **A. Sengupta**, B. Joshi, P. Sundaram, *Physics of Fluids*, **35 (5)**, 056111 (2023). https://doi.org/10.1063/5.0152037

10. **[I.F. 2.05, CIT 5] Non-Overlapping High Accuracy Parallel Closure for Compact Schemes: Application in Multiphysics and Complex Geometry**— P. Sundaram, **A. Sengupta**, V. K. Suman and T. K. Sengupta, *ACM Transactions of Parallel Computing*, 10(1), 1-28 (2023). https://doi.org/10.1145/3580005

11. **[I.F. 3.17, CIT 6] Role of unstable thermal stratifications on the Rayleigh-Taylor instability** — **A. Sengupta** and A. K. Verma, *Comput. Fluids*, **252**:105773 (2023). https://doi.org/10.1016/j.compfluid.2022.105773

12. **[I.F. 4.98, CIT 6] Effects of stabilizing and destabilizing thermal gradients on reversed shear-stratified flows: Combined Kelvin-Helmholtz Rayleigh-Taylor instability**— **A. Sengupta** and B. Joshi, *Phys. Fluids*, **35(1)**, 012118 (2023). https://doi.org/10.1063/5.0135692

13. [**I.F. 3.553, CIT 8**] **A non-overlapping high accuracy parallel subdomain closure for compact scheme: Onset of Rayleigh-Taylor instability by ultrasonic waves** – P. Sundaram, **A. Sengupta**, T. K. Sengupta, *J. Comput. Phys*., **470**, 111593 (2022). https://doi.org/10.1016/j.jcp.2022.111593

14. **[I.F. 4.98, CIT 7] Thermally-stratified free shear layers: Combined Kelvin-Helmholtz Rayleigh-Taylor instability – A. Sengupta,** B. Joshi, A. K. Verma, *Physics of Fluids*, **34(9)**, 094113 (2022). https://doi.org/10.1063/5.0118124

15. **[I.F. 4.98, CIT 8] Controlling transonic shock-boundary layer interactions over a natural laminar flow airfoil by vortical and thermal excitation** - A. Chakraborty, A. G. Roy, P. Sundaram, **A. Sengupta**, T. K. Sengupta, *Physics of Fluids*, **34(8)**, 085124 (2022). https://doi.org/10.1063/5.0104299

16. **[I.F. 4.98, CIT 15] Three-dimensional direct numerical simulation of Rayleigh-Taylor instability triggered by acoustic excitation** – **A. Sengupta**, P. Sundaram, V. K. Suman, T. K. Sengupta, *Physics of Fluids*, **34(5)**, 054108 (2022). https://doi.org/10.1063/5.0091109

17. **[I.F. 4.98, CIT 7] Comparative study of transonic shock–boundary layer interactions due to surface heating and cooling on an airfoil** - T. K. Sengupta, A. Chakraborty, A. G. Roy, **A. Sengupta**, P. Sundaram, *Physics of Fluids*, **34(4)**, 046110 (2022). https://doi.org/10.1063/5.0088362

18. **[I.F. 4.98, CIT 11] A novel compressible enstrophy transport equation-based analysis of instability during Magnus-Robins effects for high rotation rates** – V. K. Suman, J. Puttam, P. Sundaram, **A. Sengupta**, T. K. Sengupta, *Physics of Fluids*, **34(4)**, 044114 (2022). https://doi.org/10.1063/5.0090145

19. **[I.F. 1.1, CIT 9] Analysis of Pseudo-spectral Methods Used for Numerical Simulations of Turbulence** – T. K. Sengupta, V. K. Suman, P. Sundaram, **A. Sengupta**, WSEAS Transactions on Computer Research, 10: 9-24 (2022). 10.37394/232018.2022.10.2

20. **[I.F. 4.98, CIT 14] Thermal control of transonic shock-boundary layer interaction over a natural laminar flow airfoil** – T. K. Sengupta, A. G. Roy, A. Chakraborty, **A. Sengupta**, P. Sundaram, *Physics of Fluids*, **33**, 126110 (2021). https://doi.org/10.1063/5.0075692

21. **[I.F. 3.17, CIT 16] Role of non-zero bulk viscosity in three-dimensional Rayleigh-Taylor Instability: Beyond Stokes' hypothesis** – **A. Sengupta,** R. Samuel, P. Sundaram, T. K. Sengupta, *Computers and Fluids*, **225**, 104995 (2021). https://doi.org/10.1016/j.compfluid.2021.104995

22. **[I.F. 4.98, CIT 15] Multi-Scale Instabilities of Magnus-Robins Effect for Compressible Flow Past Rotating Cylinder** – P. Sundaram, T. K. Sengupta, **A. Sengupta**, V. K. Suman, Physics of Fluids, 33(3), 034129 (2021). https://doi.org/10.1063/5.0047662

During Ph. D:

23. **[I.F. 4.98, CIT 23] Effects of forced frequency oscillations and free stream turbulence on the separation-induced transition in pressure gradient dominated flows – A. Sengupta,** P. G. Tucker, *Physics of Fluids (Editor's Pick)*, **32,** 104105 (2020). https://doi.org/10.1063/5.0022865

24. [I.F. 4.98, CIT 18] Effects of forced frequency oscillations and unsteady wakes on the separation-induced transition in pressure gradient dominated flows – A. Sengupta, P. G. Tucker, *Physics of Fluids (Editor's Pick)*, **32,** 094113 (2020). https://doi.org/10.1063/5.0023679

25. **[I.F. 4.98, CIT 16] Effects of free stream excitation on the boundary layer over a semi-infinite flat plate** – P. Sundaram, V. K. Suman, **A. Sengupta**, T. K. Sengupta, *Physics of Fluids*, **32**, 094110 (2020). https://doi.org/10.1063/5.0023998.

26. **[I.F. 3.9, CIT 17] Nonmodal nonlinear route of transition to two-dimensional turbulence** – **A. Sengupta**, P. Sundaram, T. K. Sengupta, *Physical Review Research*, **2**:012033(R), (2020) https://doi.org/10.1103/PhysRevResearch.2.012033

27. **[I.F. 4.98, CIT 19] Tracking disturbances in transitional and turbulent flows: Coherent structures** – T. K. Sengupta, P. Sharma, **A. Sengupta**, V. K. Suman, *Physics of Fluids*, **31**:124106, (2019) https://doi.org/10.1063/1.5130918

28. **[I.F. 2.707, CIT 16] Direct numerical simulation of vortex-induced instability for a zero-pressure gradient boundary layer** – **A. Sengupta**, V. K. Suman, T. K. Sengupta, *Physical Review E.*, **100**:033118, (2019) https://link.aps.org/doi/10.1103/PhysRevE.100.033118

29. **[I.F. 4.98, CIT 26] Non-linear instability analysis of the two-dimensional Navier-Stokes equation: The Taylor-Green vortex problem –**T. K. Sengupta, N. Sharma, **A. Sengupta**, *Physics of Fluids*, **30**(5):054105, (2018) https://doi.org/10.1063/1.5024765

30. **[I.F. 4.98, CIT 33] An enstrophy-based linear and nonlinear receptivity theory –A. Sengupta**, V. K. Suman, T. K. Sengupta, S. Bhaumik, *Phys. Fluids*, **30**:054106, (2018) https://doi.org/10.1063/1.5029560

During B. Tech./ Before Ph. D.:

31. **[I.F. 1.47, CIT 9] Heat Transfer Enhancement in Ferrofluids Flow in Micro and Macro Parallel Plate Channels: A Comparative Numerical Study –A. Sengupta**, P. S. Ghoshdastidar, *ASME J. Thermal Science and Engineering Applications*, **10**(2):021012, (2018) 10.1115/1.4038483

32. **[I.F. 3.17, CIT 21] Hybrid sixth order spatial discretization scheme for non-uniform Cartesian grids** – N. Sharma, **A. Sengupta**, M. K. Rajpoot, R. Samuel, T. K. Sengupta, *Comput. Fluids*, **157**:208-231, (2017) https://doi.org/10.1016/j.compfluid.2017.08.034

33. **[I.F. 3.17, CIT 11] Global spectral analysis of three-time level integration schemes: Focusing phenomenon** – T. K. Sengupta, P. Saugaut, **A. Sengupta**, Kumar Saurabh, *Comput. Fluids*, **157**:182-195, (2017) https://doi.org/10.1016/j.compfluid.2017.08.033

34. **[I.F. 4.091, CIT 18] Global spectral analysis of multi-level time integration schemes: Numerical properties for error analysis** – T. K. Sengupta, **A. Sengupta**, K. Saurabh, *Applied Math. Computation*, **304**:41-57, (2017) https://doi.org/10.1016/j.amc.2017.01.026

35. **[I.F. 4.98, CIT 35] Roles of bulk viscosity on Rayleigh-Taylor instability: Non-equilibrium thermodynamics due to spatio-temporal pressure fronts** – T. K. Sengupta, **A. Sengupta**, N. Sharma, S. Sengupta, A. Bhole, K. S. Shruti, *Phys. Fluids*, **28**:094102, (2016) https://doi.org/10.1063/1.4961688

36. **[I.F. 1.608, CIT 13] Non-equilibrium thermodynamics of Rayleigh-Taylor instability** – T. K. Sengupta, **A. Sengupta**, S. Sengupta, A. Bhole, K.S. Shruti, *Int. J. Thermophysics*, **37**(4):1-25, (2016) https://doi.org/10.1007/s10765-016-2045-1

37. **[I.F. 3.553, CIT 17] A new alternating bi-diagonal compact scheme for non-uniform grids** – T. K. Sengupta and **A. Sengupta**, *J. Comput. Phys.*, **310**:1-25 (2016) https://doi.org/10.1016/j.jcp.2016.01.014

38. **[I.F. 3.17, CIT 7] Wave properties of fourth-order fully implicit Runge–Kutta time integration schemes**— S. Bhaumik, S. Sengupta and **A. Sengupta**, *Comput. Fluids*, **81**:110-121 (2013) https://doi.org/10.1016/j.compfluid.2013.04.007

Conference Publications

1. A. Bhole, S. Sengupta, **A. Sengupta**, K. S. Shruti, and N. Sharma, **Rayleigh-Taylor Instability of a Miscible Fluid at the Interface: Direct Numerical Simulation.** *In Proc. of IUTAM Symp. "Advances in Computation, Modeling and Control of Transitional and Turbulent Flows." (Eds.: Profs. T. K. Sengupta, S. K. Lele, K. R. Sreenivasan and P. A. Davidson) World Scientific Publ. Co., Singapore*, 471-481 (2015) https://doi.org/10.1142/9789814635165_0047

2. T.K. Sengupta, K.S. Shruti, **A. Sengupta,** S. Sengupta, and A. Bhole, **Entropy production in non-equilibrium framework during Rayleigh-Taylor instability.** Presented in 13th Joint European Thermodynamics Conference (JETC2015), Nancy, France, May 21-23, (2015).

3. T. K. Sengupta, **A. Sengupta**, K. S. Shruti, S. Sengupta, A. Bhole, **Non-equilibrium Thermodynamics of Rayleigh-Taylor Instability**. *J. Phys. Conf. Ser.*, 759:012079, (2016) https://iopscience.iop.org/article/10.1088/1742-6596/759/1/012079

4. **A. Sengupta**, N. V. Rao, P. G. Tucker, **Roughness induced transition in low pressure turbines.** *55th AIAA Aerospace Sciences Meeting, Texas*, 9th-13th January (2017) https://doi.org/10.2514/6.2017-0303

5. **A. Sengupta**, T. K. Sengupta, S. Sengupta, V. Mudkavi, **Effects of Error on the Onset and Evolution of Rayleigh-Taylor Instability**. *In: Deville M. et al. (eds) Turbulence and Interactions. TI 2015. Notes on Numerical Fluid Mechanics and Multidisciplinary Design, vol 135. Springer, Cham*, 233-239(2018) https://doi.org/10.1007/978-3-319-60387-2_25

6. P. Sundaram, J. C. Mendez, **A. Sengupta** and T. K. Sengupta, **Performance and Efficiency of HPC by High Accuracy Compact Scheme: Direct Numerical Simulation of Rayleigh-Taylor Instability,** *AIAA AVIATION 2023 Forum, San Diego, California*, 12-16th June (2023). https://doi.org/10.2514/6.2023-3691

Books/Book Chapters

1. **A. Sengupta**, "*Compressible enstrophy transport for flow in a low pressure turbine with unsteady wakes impinging at the inflow*" in the book **Computational Fluid Dynamics: Novel numerical and computational approaches,** Springer Nature, 2024.

Teaching Experience

1. Advanced Optimization Theory (MED573) – IIT (ISM) Dhanbad, 4th Semester M. Tech. (2020-2021).
2. Thermal Engineering Lab (MEC552) – IIT (ISM) Dhanbad, 2nd Semester M. Tech. (2020-2021).
3. Computational Fluid Dynamics (MEC551) – IIT (ISM) Dhanbad, 2nd Semester M. Tech. (2020-2021).

4. Engineering Mechanics (MEI101) – IIT (ISM) Dhanbad, 1st Semester UG Institute Core (2021-2022).
5. Fundamentals of Combustion (MEO581) – IIT (ISM) Dhanbad, Open elective (2021-2022).
6. Mechanical Engineering Lab (MEC600) – IIT (ISM) Dhanbad, 2nd Semester M. Tech. (2021-2022).
7. Energy Conversion Equipment Lab (MCC18202) – IIT (ISM) Dhanbad, 6th Semester B. Tech. (2021-2022).
8. Fluid and Thermodynamics Lab (MEC205) – 3rd Semester B. Tech. (2022-2023).
9. Engineering Mechanics (MEI101) – IIT (ISM) Dhanbad, 1st Semester UG Institute Core (2022-2023).
10. Fundamentals of Combustion (MEO581) – IIT (ISM) Dhanbad, Open elective (2022-2023).
11. Engineering Mechanics (MEI101) – IIT (ISM) Dhanbad, 1st Semester UG Institute Core (2023-2024).
12. Thermal and Design Lab – IIT (ISM) Dhanbad, 1st Semester M. Tech. (2023-24).
13. Fundamentals of Combustion (MEO581) – IIT (ISM) Dhanbad, Open elective (2023-2024).
14. Mechanical Engineering Lab (MEC601) – IIT (ISM) Dhanbad, 2nd Semester M. Tech. (2023-2024).
15. Introduction to Machine Learning (NMED531) – 1st year PG, NEP DE (2024-2025).

Supervised Research

1. Mr. Atul K. Verma (M. Tech., 2020-22): Role of thermal stratifications in free shear flows: Combined KH-RT instability [COMPLETED]
2. Mr. Arkadyuti Ghosh Roy (M. Tech., 2020-22): Thermal control of transonic shock-boundary layer interactions over a natural laminar airfoil [COMPLETED]
3. Mr. Ardhendu Chakraborty (M. Tech., 2020-22): Acoustic control of transonic shock-boundary layer interactions over a natural laminar airfoil [COMPLETED]
4. Mr. Anand Bagde (M. Tech., 2021-23): Heat transfer effects in a rectangular lid-driven lid-driven cavity with different aspect ratios [COMPLETED]
5. Mr. Narottam Shandilya (M. Tech., 2022-24): Thermal optimization for shock-induced separation in transonic shock boundary layer interactions over SHM1 airfoil [COMPLETED]
6. Ms. Nivedita Gupta (M. Tech., 2022-24): Exploring role of free stream turbulence over a T106A low pressure turbine cascade using direct numerical simulations [COMPLETED]
7. Mr. Abhijeet Guha (M. Tech., 2023-25): Optimization of vortical control for transonic SBLI on SHM1 airfoil exhibiting shock-induced separation [ONGOING]
8. Mr. Nitish Kumar (M. Tech., 2023-25): Unsteady wakes and their influence on the separation-induced transition in a T106A cascade [ONGOING]
9. Ms. Bhavna Joshi (Ph. D., 2021-): High performance computing of transition to turbulence for multiphysical flows [ONGOING]
10. Mr. Arjun Gond (Ph. D., 2022-): Application of net zero carbon fuels in multiphysical applications [ONGOING]
11. Mr. Sanjeev Kumar (Ph. D., 2023 -): Optimal passive control of combustion of net zero carbon fuels [ONGOING]
12. Ms. Priya Pal (Ph. D., 2024 -): Direct numerical simulations of disturbance environments in a low pressure turbine T106A cascade [ONGOING]

Administrative Work

1. Serving as member of departmental faculty screening committee (DFSC), (2021 – present).
2. Faculty-in-charge for minor in product development innovation offered under the “Aeronautics and Space Technology” club, (2022 – present).
3. IIT JEE Advanced Counsellor (November 2021).

4. Core committee member for conference on “Industrial Problems on Machines and Mechanisms” (IPRoMM) under aegis of AMM held in December 2022.
5. Department Undergraduate Committee (DUGC) member (2022 – present)

Computational and Analytical Skills

- Analysis of the accuracy and performance of spatial and temporal discretization schemes in high accuracy compact schemes through global spectral analysis
- Developing compact schemes for non-uniform grids operating in the physical plane
- Extensive experience in parallelized 3D Navier-Stokes solvers using Message Passing Interface protocol and domain decomposition in FORTRAN
- High accuracy and high performance computing on various computing facilities – DARWIN at the Department of Engineering, Cambridge and ARCHER supercomputer maintained by the UK Turbulence Consortium, ARYABHATA HPC at IIT (ISM) Dhanbad and PARAM Pravega of IISc Bangalore.
- Application of an immersed boundary method based on volume-of-fluid approach
- Extensive experience in Tecplot and Matlab for various postprocessing operations
- Computer languages/utilities known: **C++, HTML, FORTRAN90, SQL, Visual Basic, Tecplot, MATLAB, LaTeX, Microsoft Visio, OriginLab.**