Aasheesh Bajpai, Ph.D.

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Education

2020 – Present — **Ph.D., Aerospace Engineering, Indian Institute of Technology Kanpur** at NFSL. (CPI : 10/10)
Thesis title: *Computational modeling of dusty gas flow in DSMC-DEM framework for planetary landing.*
Thesis supervisor: *Prof. Rakesh Kumar*

2017 – 2019 — **M.Tech. Cryogenic Engineering, Institute of Technology Kharagpur** at PED Lab. (CPI : 8.51/10)
Thesis title: *Development of test rig towards experimental investigation of Reverse Brayton Cryocooler used for cooling of High Temperature Superconductors.*
Thesis supervisor: *Prof. Parthasarathi Ghosh*

2012 – 2016 — **B.Tech. Mechanical Engineering, AKTU, U.P.** at AKGEC, Ghaziabad. (Honours)
Thesis title: *Design, Fabrication and Review of GO-KART.*
Responsibility: Managed a team of 10 engineers
Thesis supervisor: *Mr. Ankur Tyagi*

Work experience

July – Dec 2019 — **Research Assistant** at IIT Kharagpur
I worked on enhancing exergetic efficiency of hydrogen liquefaction plant in which specifically we enhanced the efficiency of cryogenic turboexpanders to increase the overall efficiency of process.

Training

02 – 07 October 2023 — **CISM advanced Course** *"Landslides Mechanics: from Complex Granular Behaviour to Field-Scale Flows"*

24 July – 16 August 2023 — **NPSF workshop** *Parallel computing*

09 – 14 July 2023 — **Advanced Measurement Techniques in Fluid Mechanics** *Workshop organised by center for continuing education by Prof. Saptarshi Basu at IISc Bangalore*

05 – 09 Dec 2022 — **Multiphase Combustion: Theory and Modelling** *Short term GIAN course organised by IIT Kanpur*

17 – 20 May 2022 — **High Performance Computing (HPC) for Computational Fluid Dynamics (CFD) Applications** *Organised by IIT Bombay and C-DAC under the aegis of National Supercomputing Mission(NSM)*

Training (continued)

July – August 2015 — **Vocational Training in NTPC, Dadri**
Work: *Boiler maintenance and Ash handling department, Learnt about Power plant process, Rankine cycle and various equipment used etc. Also submitted a project report on Cooling Tower*

June – July 2014 — **In workshop training Indian Railways workshop, Izzatnagar, Bareilly**
Work: *Braking system in locomotive (Air brakes, pneumatic brakes), working of engine of locomotive, carriage maintenance.*

Research Publications

Journal Articles

1. A. Appar, A. **Bajpai**, and R. Kumar, "Numerical study of gas surface interface effects due to transpiration in hypersonic flow over a blunt body," *Physics of Fluids*, vol. 36, no. 1, p. 016 134, Jan. 2024.
2. A. **Bajpai**, A. Bhateja, and R. Kumar, "Plume surface interaction during lunar landing," *Accepted in 'Physical Review Fluids (PRF) FE10224'*, Feb. 2024. DOI: https://journals.aps.org/prfluids/accepted/6d074S31R471370902702364551 05f554df37c71b.
3. A. Appar, A. **Bajpai**, U. Shivkumar, S. Naspoori, and R. Kumar, "Rarefied gas effects on hypersonic flow over a transpiration-cooled flat plate," *Physics of Fluids*, 35 (1): 016109. Jan. 2023. DOI: 10.1063/5.0131259.
4. A. **Bajpai**, A. Bhateja, and R. Kumar, "Analysis of regolith erosion and crater formation during lunar landing," *Manuscript under prepration*, 2023.
5. A. **Bajpai**, S. Kumar, S. Kumar, and R. Kumar, "Shock wave interaction with a granular curtain," *Manuscript under prepration*, 2023.
6. A. **Bajpai**, A. Wangikar, and R. Kumar, "Computational investigation of moving shock interaction with a granular particle curtains," *Manuscript prepared*, 2023.
7. A. Wangikar, A. **Bajpai**, and R. Kumar, "Supersonic dusty gas flow past a cylinder in eulerian-lagrangian framework," *'Physics of Fluids'*, 35 (12): 123323, Dec. 2023. DOI: 10.1063/5.0174388.
8. A. **Bajpai**, R. Dutta, and P. Ghosh, "Parameter estimation of equipment for development of an experimental setup of a reverse brayton cryocooler for cooling hts cables," *Indian Journal of Cryogenics*, vol. 44, p. 83, Jan. 2019. DOI: 10.5958/2349-2120.2019.00014.1.

Conference Proceedings

1. A. Appar, A. **Bajpai**, and R. Kumar, "Numerical study of gas surface interface effects due to transpiration in a hypersonic flow over a blunt body," in *Fluid Mechanics and Fluid Power (FMFP-2023)), Springer 2023 (Manuscript accepted), PAPER ID: FMFP2023-MIS-462.*
2. A. **Bajpai**, A. K. Dhillon, R. Dutta, and P. Ghosh, "Root cause analysis of early performance deterioration of an existing helium liquefier using process simulation," in *15th Cryogenics, IIR international conference proceedings, 2019.*
3. A. **Bajpai**, S. Kumar, A. Wangikar, S. Kumar, and R. Kumar, "Moving shock interaction with the granular particle curtain," in *Fluid Mechanics and Fluid Power (FMFP-2023)), Springer 2023 (Manuscript accepted),PAPER ID: FMFP2023-MIS-465.*

4. A. **Bajpai**, A. Wangikar, and R. Kumar, "Numerical simulation of supersonic dusty gas flow over a cylinder in the eulerian-lagrangian framework," in *International Symposium on Shock Waves (ISSW34) in Daegu, Korea, July 16-21, 2023.*

5. A. K. Dhillon, A. **Bajpai**, and P. Ghosh, "The effect of hts heat rejection conditions on performance of reverse brayton cryocooler," in *15th Cryogenics, IIR international conference proceedings, 2019.*

Conference Presentation

1. A. **Bajpai**, A. Bhateja, and R. Kumar, *Plume surface interaction during lunar landing*, 3 min Flash talk at IUTAM symposium on Rapid granular flows and turbulent particle suspensions, IIT Bombay, Powai, Mumbai, India, Jan 21-25, 2024, 2024.

2. A. **Bajpai**, A. Bhateja, and R. Kumar, *Computational modeling of dusty gas flows in a coupled dsmc-dem framework for lunar landing.* Asian Computational Fluid Dynamics Conference (ACFD-2023) in Bengaluru, India, October 30- November 02, 2023, 2023.

3. A. **Bajpai**, S. Kumar, A. Wangikar, R. Kumar, and S. Kumar, *Moving shock interaction with the granular particle curtain*, Fluid Mechanics and Fluid Power (FMFP-2023)), Springer 2023 (Manuscript accepted), PAPER ID: FMFP2023-MIS-465, 2023.

4. A. **Bajpai**, A. Wangikar, and R. Kumar, *Numerical simulation of supersonic dusty gas flow over a cylinder in the eulerian-lagrangian framework*, International Symposium on Shock Waves (ISSW34) in Daegu, Korea, July 16-21, 2023, 2023.

5. D. Dutta, A. **Bajpai**, and R. Kumar, *Dusty gas flows over a circular cylinder: A cfd-dem approach.* Asian Computational Fluid Dynamics Conference (ACFD-2023) in Bengaluru, India, October 30- November 02, 2023, 2023.

6. A. Wangikar, A. **Bajpai**, and R. Kumar, *Numerical simulation of moving shock wave interacting with particle bed using a coupled eulerian-lagrangian framework.* Asian Computational Fluid Dynamics Conference (ACFD-2023) in Bengaluru, India, October 30- November 02, 2023, 2023.

7. A. Appar, U. Shivkumar, A. **Bajpai**, S. Naspoori, and R. Kumar, *Validity of the blowing correction correlation in rarefied flow regimes*, 32nd International Symposium on Rarefied Gas Dynamics (RGD32) at Seoul, South Korea on 4th to 8th July, 2022.

8. A. **Bajpai**, A. Appar, S. Naspoori, and R. Kumar, *Numerical investigation of pyrolysis gas interaction with hypersonic reentry flow-field*, 32nd International Symposium on Rarefied Gas Dynamics (RGD32) at Seoul, South Korea on 4th to 8th July, 2022.

9. A. **Bajpai**, M. Bhavsar, D. Dutta, A. Bhateja, and R. Kumar, *Lagrangian-lagrangian simulation of dusty gas flow past a cylinder*, Traffic & Granular Flow (TGF-2022)- at IIT Delhi, Delhi, India on 15th to 17th October, 2022.

10. M. Bhavsar, A. **Bajpai**, A. Khan, and R. Kumar, *Granular flow past an elliptical obstacle*, Traffic & Granular Flow (TGF-2022)- at IIT Delhi, Delhi, India on 15th to 17th October, 2022.

11. R. Kumar, A. Chinappan, A. **Bajpai**, A. Bhateja, and M. Bhavsar, *Modeling of lunar dust dispersion using two-way coupled lagrangian-lagrangian framework*, 32nd International Symposium on Rarefied Gas Dynamics (RGD32) at Seoul, South Korea on 4th to 8th July, 2022.

12. A. **Bajpai**, A. K. Dhillon, R. Dutta, and P. Ghosh, *Root cause analysis of early performance deterioration of an existing helium liquefier using process simulation*, IIR international conference, April 7-11, 2019, Prague, Czech Republic, Europe, 2019.

13. A. **Bajpai**, R. Dutta, and P. Ghosh, *Parameter estimation of equipment for development of an experimental setup of a reverse brayton cryocooler for cooling high temperature superconducting cables*, National Symposium in Cryogenics and Superconductivity-27 at IIT Bombay, Mumbai, India on 16th to 18th January, 2019.

Poster presentations

1. A. **Bajpai**, A. Bhateja, and R. Kumar, *Plume surface interaction during lunar landing*, IUTAM symposium on Rapid granular flows and turbulent particle suspensions, IIT Bombay, Powai, Mumbai, India, Jan 21-25, 2024, 2024.
2. A. **Bajpai**, A. Appar, S. Naspoori, and R. Kumar, *Numerical investigation of pyrolysis gas interaction with hypersonic reentry flow-field*, 32nd International Symposium on Rarefied Gas Dynamics (RGD32) - 2022 at Seoul, South Korea on 4th to 8th July, 2022.
3. A. **Bajpai**, A. K. Dhillon, and P. Ghosh, *The effect of hts heat rejection conditions on performance of reverse brayton cryocooler*, IIR international conference, April 7-11, 2019, Prague, Czech Republic, Europe, 2019.

Skills

Languages	Strong reading, writing and speaking competencies for English and Hindi
Coding	Modern Fortran, FORTRAN, C, C++, Python, Linux BASH Programming, LaTeX
Python libraries	Numpy, Pandas, Matplotlib,
Parallel programming	OpenMP, MPI.
Experimental Techniques	High-Speed Imaging, Image Processing, PIV, Schlieren.
Operating Systems	Linux(Ubuntu, Red Hat Enterprise), Windows, MacOS.
HPC and DevOps Skills	Comfortable with SLURM, PBS Pro, Software compilation/building from source on Linux platform, and benchmarking.
Simulation Techniques	Direct Simulation Monte Carlo (DSMC), Discrete Element Method (DEM), Computational Fluid Dynamics (CFD)
Modelling Techniques	Proficient in process and multi-physics modeling, including implementation, Skilled in algorithm development, numerical methods, and scientific computing.
Software	SPARTA(DSMC), LIGGGHTS(DEM), LAMMPS, OpenFOAM(CFD), CFD-DEM, SOLIDWORKS, Pro-E, Ansys Fluent, ANSYS CFX, BladeGen.
Other software	MS Office, Visual Studio, Tecplot, Ovito, LabVIEW, VEUSZ, ORIGIN, Engineerig Equation Solver, Aspen- HYSYS, Aspen-EDR, HYSYS- Dynamics, ImageJ.
Web Dev	Html, css
Misc.	Academic research, collaboration and outstanding teamwork, robust debugging and problem-solving skills, mentoring and leadership proficiency, project management, Strong analytical skills, literature survey proficiency, adeptness in technical writing, teaching and training capabilities, consultation, LaTeX typesetting and publishing proficiency, proficient in drafting reports and crafting conference papers, story-telling and presentation skills.

Miscellaneous Experience

Awards and Achievements

2023 **Received full scholarship (600 Euros) from CISM to attend a course name "Landslides Mechanics: from Complex Granular Behaviour to Field-Scale Flows"** at Udine, Italy from 2-7 October, 2023.

Miscellaneous Experience (continued)

- **Received full financial assistance from IIT Kanpur, to attend the ISSW-34, the 34th International Symposium on Shock Waves** at Daegu, South Korea on 16th to 21st July, 2023.

2022

- **Achieved full financial assistance from IIT Kanpur, to attend the RGD-32, International Symposium on Rarefied Gas Dynamics** at Seoul, South Korea on 4th to 8th July, 2022.

2019

- **Got the prestigious Prime Minister Research Fellowship (PMRF)** from Ministry of Education, Govt. of India for Ph.D. program.
- **Achieved full financial assistance from IIT Kharagpur under the category of Best Academic International Conference, to attend the 15^{th} Cryogenics, IIR international conference** at Prague, Czech Republic, Europe. from April 7-11, 2019.

2015

- **Participated and won first runner-up title in IGC LPU and managed a team of 10 engineering students**, Lovely Professional University, Haryana.

Teaching Experience

Fall 2023

- **Live tutor and Teaching Assistant NPTEL**. Computational Fluid Dynamics and Heat Transfer. Took two hours weekly live classes for 972 students along with that I was a teaching assistant for this course in which I have to manage the assignments and evaluations.

May 2023

- **Teaching assistant** . Responsible for conducting interviews for admission into Aerospace Engineering department, IIT Kanpur

December 2022

- **Teaching assistant** . Responsible for conducting interviews for admission into Aerospace Engineering department, IIT Kanpur.

Fall 2022

- **Tutor NPTEL**. Computational Fluid Dynamics and Heat Transfer.
  Took weekly live classes for 2188 Students

Spring 2022

- **Tutor NPTEL**. Introduction to programming with C.
  Took weekly live classes for 44925 Students

Fall 2021

- **Teacher**. Introduction to Thermodynamics
  Took recorded classes for 40 Students.

- **Teaching Assistant, IIT Kanpur**.
  AE451(A) : Experiments in Fluid (Aerodynamics Experiments)

Spring 2021

- **Teaching Assistant, IIT Kanpur**.
  (ESO201A: Thermodynamics)

Spring 2019

- **Teaching Assistant, IIT Kharagpur**.
  (CR61022: Cryogenic Expansion Devices (Turbomachinary))

Fall 2018

- **Teaching Assistant, IIT Kharagpur**.
  (CR61011: Compressors and Pumps)

Miscellaneous Experience (continued)

Certification

2023 — **Introduction to OpenFOAM**. Awarded by 'Skill-share'.

January-2015 — **Automation technologies-Basic level**. Awarded by 'Rexroth Bosch Group'. Topics covered-Industrial Hydraulics, Industrial pneumatics, PLC

2014-15 — **Training program on Pro/Engineer** . Awarded by 'RICC AKGEC'.

Co-curricular and extracurricular activities

Reviewer — Physics of Fluids

Leadership and mentoring experience — Assisted 3 M.Tech projects, 2 Bachelor's project and 1 B.tech internship,
Played a vital role in preparing the course curriculum for the course 'Cryogenic Expansion Devices', at IIT Kharagpur

Social work — Member of councelling services, IIT Kanpur,
Active member of hall task force for tackling Covid-19 issues,
Served as a member of Mess committee of hall.

Membership — Former head of Indian Society for Technical Education at AKGEC.

Managerial skills — Organized a successful fest at undergraduate level, Organized research scholar day at IIT Kharagpur, India

Fitness skills — Active practitioner of yoga, pranayama, meditation and a cycling enthusiast.

Interests — Space science & astronomy, rocket science, international affairs and geopolitics, cooking, ayurveda, cricket, Advaita Vedanta philosophy, music and travelling.

References

Available on Request