Aasheesh Bajpai

Ph.D (Aerodynamics)
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Summary of work experience

Results-driven CFD engineer with 5+ years of experience in optimizing complex flow systems. Proven expertise in multi-phase/multiscale modeling, solver development, and solving intricate flow challenges using both open-source and software.

Academic Qualifications

Year	Degree	Institute	CPI/%
2020 - Present	Ph.D. (Aerodynamics) [**PMRF**]	Indian Institute of Technology, Kanpur	10/10
2019	M.Tech. (Cryogenic Engineering)	Indian Institute of Technology, Kharagpur	8.51/10
2016	B.Tech. (Mechanical Engineering)	AKTU, Lucknow	7.6/10
2011	Higher Secondary(XII)	UP Board	85.8%
2009	Secondary(X)	UP Board	85.5%

Academic Projects

- **Ph.D. thesis:** (Mentor: Prof. Rakesh Kumar, IIT Kanpur.) (*Ongoing*)
  1. Developed an in-house parallel Eulerian-Lagrangian (CFD-DEM) solver with OpenFOAM for supersonic dusty gas flows.
  2. Simulated and experimentally verified interactions of shock-wave with granular curtains using the aforementioned CFD-DEM multiphase-flow solver.
  3. Developed a parallel DSMC-DEM coupled Lagrangian-Lagrangian solver for lunar dusty gas flows
  4. Simulated pyrolysis gas effects on heat flux and shock stand-off distance in re-entry hypersonic vehicles.
  5. Numerically simulated and experimental verified granular flow over a chute.
- **Master's project:** (Mentor: Prof. Parthasarathi Ghosh, IIT Kharagpur.) (*April 18 to May 19*)
  Developed a turbine test rig by converting a decommissioned helium liquifier into a reverse Brayton cryocooler for HTS cooling, using ANSYS FLUENT for turbine design and ASPEN for parameter estimation.
- **B.Tech project:** (Mentor: Prof. Ankur Tyagi, AKGEC Ghaziabad. (*May 15 to May 16*)
  Led the design and fabrication of a Go-kart, focusing on CAD design, material sourcing, and performance optimization.

Technical Skills

- **Softwares:** OpenFOAM, CFD-DEM, Ansys (FLUENT, WORKBENCH, ICEM CFD), SOLIDWORKS, Pro-E, ANSYS CFX, SPARTA, LIGGGHTS, LAMMPS, EDEM.
- **Programming Languages:** FORTRAN, C/C++, Python, MATLAB, Linux BASH Programming, Git & Github.
- **Libraries and frameworks:** NumPy, Matplotlib, Pandas, Scikit-Learn.
- **HPC and DevOps Skills:** OpenMP, MPI, SLURM, PBS Pro, Software compilation, Benchmarking
- **Simulation Techniques:** Computational Fluid Dynamics (CFD), Coupled simulations, Direct Simulation Monte Carlo (DSMC), Discrete Element Method (DEM)
- **Modelling Techniques:** Multi-physics modeling, algorithm development, numerical methods.
- **Experimental Techniques:** High-Speed Imaging, Image Processing, PIV, Schlieren.
- **Other softwares:** Microsoft office (Excel, Word, PowerPoint), Visual Studio, ANSYS Meshing platform, Tecplot, OriginLab, Ovito, Paraview, ImageJ, LabVIEW, VEUSZ, Aspen- HYSYS,EDR, HYSYS-Dynamics, HTML, CSS.

Awards and Scholastic Achievements

- Awarded prestigious Prime Minister Research Fellowship (PMRF) by the MoE, Govt. of India for Ph.D.
- Published 5 journal articles and presented at 16 national and international conferences.
- Awarded full financial assistance from **DST-SERB** to attend RGD-33 in Göttingen, Germany.
- Best Poster Presentation at Research Scholars Day-2024, IIT Kanpur.
- Received scholarship from CISM twice to attend courses in Udine, Italy
- Received full financial support from IIT Kanpur for ISSW-34 (Daegu, South Korea, July 16-21, 2023) and RGD-32 (Seoul, South Korea, July 4-8, 2022). Also funded by IIT Kharagpur for IIR-15 (Prague, April 7-11, 2019).

Trainings

- **CISM** "Landslides Mechanics: from Complex Granular Behaviour to Field-Scale Flows." [02 – 07 October 2023]
- **NPSF workshop:** Parallel computing for CFD solver development [24 July – 16 August 2023]
- **Advanced Measurement Techniques in Fluid Mechanics** [09 – 14 July 2023]
- **Multiphase Combustion: Theory and Modelling** GIAN course (IIT Kanpur) [05 – 09 Dec 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) [17 – 20 May 2022]

Co-curricular and Extracurricular Activities

- **Live tutor (NPTEL):** "CFD and Heat Transfer" [2023, 2022] and "Introduction to C" [2022]
- **Reviewer:** Physics of Fluids
- **Social work:** Member of counselling services, IIT Kanpur
- Assisted multiple M.Tech and Bachelor's projects and internships, taught core engineering courses under PMRF, and served as a TA for UG and PG courses at IIT Kanpur and IIT Kharagpur.

Journal Publications

1. **Aasheesh Bajpai**, Ashish Bhateja and Rakesh Kumar "Plume-surface interaction during lunar landing using a two-way coupled DSMC-DEM approach" 23 February 2024 (Physical Review Fluids) "Editor's suggestion"
2. Ahilan Appar, **Aasheesh Bajpai**, Rakesh Kumar; "Numerical Study of Gas Surface Interface Effects due to Transpiration in Hypersonic Flow over a Blunt Body". Physics of Fluids 18 January 2024; 36 (1).
3. Aaditya Wangikar, **Aasheesh Bajpai**, Rakesh Kumar; "Supersonic dusty gas flow past a cylinder in Eulerian-Lagrangian framework". Physics of Fluids 1 December 2023; 35 (12): 123323.
4. Ahilan Appar, **Aasheesh Bajpai**, Udhaya K. Sivakumar, Srujan K. Naspoori, Rakesh Kumar;"Rarefied gas effects on hypersonic flow over a transpiration-cooled flat plate". Physics of Fluids 1 January 2023; 35 (1): 016109.
5. **Aasheesh Bajpai**, Rohan Dutta and Parthasarathi Ghosh. "Parameter Estimation of Equipment for Development of an Experimental Setup of a Reverse Brayton Cryocooler for Cooling High Temperature Superconducting Cables". Indian Journal of Cryogenics, 2019