Tanmay Agrawal

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Education

- **Indian Institute of Technology Delhi** — India
  Ph.D. *in Applied Mechanics; GPA: 9.78/10* — *2021 – 2025*
  Thesis: Role of fluid transport on sealing effectiveness of air curtains
  Advisors: Prof. Narsing K. Jha and Prof. Vamsi K. Chalamalla

- **The University of Melbourne** — Australia
  M. Phil. *in Mechanical Engineering* — *2017 – 2020*
  Thesis: Investigation of mixing in gravity currents using high-resolution molecular tagging techniques
  Advisors: Prof. Joe Klewicki and Prof. Jimmy Philip

- **National Tsing Hua University** — Taiwan
  M. S. *in Mechanical Engineering; GPA: 4.19/4.30* — *2014 – 2016*
  Thesis: Simulation of incompressible flows using artificial compressibility method
  Advisor: Prof. Chao-An Lin

- **National Institute of Technology Hamirpur** — India
  B. Tech. *in Mechanical Engineering; GPA: 8.96/10* — *2010 – 2014*
  FYP: Modeling of solar absorption refrigeration systems
  Advisors: Prof. Anoop Kumar and Prof. Varun Goel

Publications in Peer-reviewed Journals

1. Tanmay Agrawal, Shresth Agarwal, Vamsi K. Chalamalla and Narsing K. Jha, Performance and flow dynamics of heavy air curtains using experiments and numerical simulations. In **Environmental Fluid Mechanics**, 2024.
2. Tanmay Agrawal, Narsing K. Jha and Vamsi K. Chalamalla, Numerical investigation of air curtain flows in the doorway of a building using RANS and LES. In **Computers & Fluids**, vol. 263, pp. 105948, 2023.
3. Tanmay Agrawal, Siva Heramb Peddada and Vamsi K. Chalamalla, Dynamics of a buoyant gravity current propagating in a linearly stratified medium. In **Physics of Fluids**, vol. 34, pp. 076605, 2022.
4. Tanmay Agrawal, Bhaarath Ramesh, Spencer J Zimmerman, Jimmy Philip and Joseph C Klewicki, Probing the high mixing efficiency events in a lock-exchange flow through simultaneous velocity and temperature measurements. In **Physics of Fluids**, vol. 33, pp. 016605, 2021. This paper was selected as **Editor's Picks** for the corresponding volume.
5. Xiaolei Shi, Tanmay Agrawal, Chao-An Lin, Feng-Nan Hwang and Tzu-Hsuan Chiu, A parallel nonlinear multigrid solver for unsteady incompressible flow simulation on multi-GPU cluster. In **Journal of Computational Physics**, vol. 414, pp. 109447, 2020.
6. Tanmay Agrawal, Varun and Anoop Kumar, Solar Absorption Refrigeration System for Air-Conditioning of a Classroom Building in Northern India. In **Journal of The Institution of Engineers: Series C**, vol. 96, pp. 389-396, 2015.

Manuscripts under review & preparation

1. Tanmay Agrawal, Vamsi K. Chalamalla and Narsing K. Jha, Effects of cross-stream buoyancy on the dynamics of turbulent impinging line fountains. Under revision in Journal of Fluid Mechanics.
2. Tanmay Agrawal, Vamsi K. Chalamalla and Narsing K. Jha, Infiltration and transport dynamics in air curtains. Under review in Journal of Fluid Mechanics.

Book Chapters

1. Tanmay Agrawal, Marius Ungarish and Vamsi K. Chalamalla, On the equivalence of top and bottom gravity currents in a linearly stratified channel. Accepted for publication by AGU Books in the monograph series focussed on **Particulate Gravity Currents**.

Selected Conference Presentations

1. Tanmay Agrawal, Narsing K Jha and Vamsi K Chalamalla, Velocity statistics of air curtain flows using LES and PIV. Presented in the **1st European Fluid Dynamics Conference, EFDC1** held at RWTH University, Aachen, Germany in September 2024.
2. Tanmay Agrawal, Narsing K Jha and Vamsi K Chalamalla, Towards understanding air curtain flows using RANS based numerical simulations. Presented in the **ISHMT-ASTFE Heat and Mass Transfer Conference** held virtually at IIT Madras, India in December 2021.
3. Tanmay Agrawal, Jimmy Philip and Joe Klewicki, Estimation of mixing in a lock-exchange flow using molecular tagging velocimetry and thermometry. Presented in the **APS Division of Fluid Dynamics Meeting** held at Seattle, USA in November 2019.
4. Tanmay Agrawal, Spencer Zimmerman, Jimmy Philip and Joe Klewicki, Experimental investigation of lock-exchange flow using MTV/MTT. Presented in the **European Turbulence Conference** held at Torino, Italy in September 2019.
5. Tanmay Agrawal and Chao-An Lin, Implementation of an incompressible lattice Boltzmann model on GPU to simulate Poiseuille flow. Presented in the **Fluid Mechanics and Fluid Power (FMFP)** conference held at NIT Hamirpur, India in December 2013.

Skills & Expertise

- **Experimental fluid mechanics:** Optical diagnostic techniques: a) Particle Image Velocimetry (PIV): planar and stereo measurements for stratified flows. b) Molecular Tagging Velocimetry (MTV) and Molecular Tagging Thermometry (MTT) in turbulent flow. c) Shadowgrapy using high-speed optics and DSLR. d) Flow visualization using various dyes e.g. fluorescein (PLIF), color additives. Temperature measurements using RTDs and thermocouples. Pressure and flow rate measurement devices along with system integrations using LabVIEW. Design and fabrication support for flow facilities. Have working knowledge of hot-wire anemometry.
- **Computational fluid dynamics:** Solver development (C, C++, CUDA-C), ANSYS Fluent: single and multiphase flows, SOMAR (in-house LES solver for stratified turbulent flows implemented with adaptive mesh refinement), DNS, multigrid method, immersed boundary method, lattice Boltzmann method, GPU computing.
- **Analysis and design tools:** MATLAB, Autodesk Inventor, Visit, Python, Tecplot, LaTeX, Microsoft Excel, Adobe Illustrator, Adobe Premiere Pro.

Awards & Scholarships

- **Research Excellent Travel Award:** Monetary assistance (INR 2,00,000) provided to selected PhD students in the institute towards presenting in an international conference. Provided by Indian Institute of Technology Delhi in 2024.
- **Prime Minister Research Fellowship:** Highly competitive PhD fellowship that includes a research grant (INR 2,00,000 per year) followed by a rigorous annual review. Provided by Government of India during 2022 – 2024.
- **SERB International Travel Support:** Financial assistance (INR 1,75,000) towards attending summer school at University of Cambridge, UK. Provided by Government of India in 2023.
- **Melbourne Postgraduate Research Scholarship:** Scholarship for meritorious international students to pursue a research degree. Provided by The University of Melbourne during 2017 – 2020.
- **NTHU International Student Scholarship:** Fully-funded postgraduate scholarship to undertake a master degree. Provided by National Tsing Hua University during 2014 – 2016.

Workshops & Internships

- **Fluid Dynamics of Sustainability & Environment (FDSE):** Participated in the two-week long summer school in September 2023, organized by Department of Applied Mathematics and Theoretical Physics (DAMTP) at University of Cambridge, UK. Expert lectures were given on various topics of environmental flows. Hands-on experimental demonstrations and numerical solvers were utilized to illustrate data acquisition and processing techniques.
- **Computational fluid dynamics laboratory:** Worked as an intern during May – July 2013 at National Tsing Hua University, Taiwan. Developed two-dimensional parallel solvers based on lattice Boltzmann method using CUDA-C to simulate incompressible fluid flows on graphic processing unit (GPU). The solver was validated with lid-driven cavity flow and was extended to solve for flow over a cylinder using immersed boundary method (IBM).

Teaching Experience

- **Indian Institute of Technology Delhi:** Assisted teaching fluid mechanics (UG & PG), computational fluid dynamics (PG), environmental fluid mechanics (PG) & Engineering mechanics (UG) between 2021 and 2024.
- **University of Melbourne:** Conducted workshops and laboratory sessions for the courses on civil hydraulics (PG), fluid mechanics (UG) from 2018 to 2020.
- **National Tsing Hua University:** Graduate teaching assistant for the course on gas dynamics (UG) for the academic year 2015-16. Conducted tutorials and graded assignments and exams.

Courses Credited

- **Graduate courses:** Physics of turbulent flows, turbulence and its modeling, experimental methods, computational fluid dynamics, heat conduction, introduction to microfluidic systems and laminar flow theory.
- **Undergraduate courses:** Engineering mathematics, Material science and engineering, Engineering mechanics and strength of materials, Numerical analysis, Mechanics of solids, Fluid mechanics, Thermal engineering, Turbomachinery, Heat transfer, Operations research, Theory of machines, Automobile engineering, Machine design, Computer aided manufacturing, Computational methods in fluid dynamics and heat transfer, Management information systems, Refrigeration and air conditioning, Mechanical vibrations.

Leadership Roles & Extracurricular Activities

- **President, Mechanical Engineering Research Student Association (MERSA):** In-charge for organization of multiple academic and fun events such as technical workshops, outdoor trips etc. to enhance interaction between various research groups within the department. Held at The University of Melbourne between 2018 to 2020.
- **Runner and training assistant:** Participated in many running events (individual and relay) with distances varying from 1 mile to 105 KM with the best performance being in a half-marathon (21.1K) event as the fifth fastest runner. Assisted as pacer in many 5K and 10K races and helped people reach their target finish times.
- **YouTube educator:** Teaching on the online platform, primarily in the field of thermofluids and design, and having a student base of more than 14,500 with multiple videos having 50K+ views.

References

- Prof. Narsing K. Jha, Indian Institute of Technology Delhi: narsingjha@am.iitd.ac.in
- Prof. Vamsi K. Chalamalla, Indian Institute of Technology Delhi: vchalama@am.iitd.ac.in
- Prof. Joe Klewicki, The University of Melbourne, Australia: klewicki@unimelb.edu.au
- Prof. Jimmy Philip, The University of Melbourne, Australia: jimmyp@unimelb.edu.au
- Prof. Chao-An Lin, National Tsing Hua University, Taiwan: calin@pme.nthu.edu.tw

I certify that the information provided above is correct to the best of my knowledge. In case of any questions, please contact either through the given e-mail address or phone.

September 9, 2025 Tanmay Agrawal