Monal Patel

14 Torrington Road, Wellingborough, NN8 5AF, UK
(+44) 7596705390
monal-@hotmail.com

Education

2018-2022 **PhD**, *Department of Mechanical Engineering, Imperial College London*, UK
Thesis title: Hypersonic Flows Around Complex Geometries with Adaptive Mesh Refinement and Immersed Boundary Method, supervised by Dr. Salvador Navarro-Martinez

2012-2017 **MEng with a Year in Industry**, *Department of Mechanical Engineering, Imperial College London*, UK
• Modules studied: Fluid Mechanics, Thermodynamics, Computational and Continuum Mechanics, Stress Analysis, Mathematics, Combustion, Mechatronics and Control, Aircraft Engine Technology, Nuclear Energy.
• Led design, manufacture and test of a novel experimental sensor for car turbo-chargers, and an e-scooter.
• Other activities: UK Students for the Exploration and Development of Space (UKSEDS), Imperial College CubeSat Design, Engineers Without Borders, Imperial Water Brigades and Imperial College Baseball team.

Research Experience

Summer 2015 **Undergraduate Research Opportunities Program (UROP)**, *Imperial College London*, UK
Project: Improve low-cost shock tube
• Designed and sourced diaphragm clamp, upgrade pressure transducers and data acquisition system.
• Developed Laboratory Virtual Instrument Engineering Workbench (LabVIEW) interface.
• Conducted test runs and validate the shock tube rig.

Publications

Journal article Monal Patel and Salvador Navarro-Martinez."Hypersonic Flows with Structured Adaptive Mesh Refinement and Ghost Point Immersed Boundary Method (SAMR-GPIBM)". *Journal of Computational Physics* (In preparation).

Journal article Monal Patel and Salvador Navarro-Martinez. "Heat transfer to proximal cylinders in high speed flows". *Physics of Fluids* (In preparation).

PhD Thesis Monal Patel. Hypersonic Flows Around Complex Geometries with Adaptive Mesh Refinement and Immersed Boundary Method. *Imperial College London, 2022* (In review).

Conference paper Monal Patel and Salvador Navarro-Martinez."Hypersonic Ablation Modelling with Adaptive Mesh Refinement and Immersed Boundary Method". *2nd International Conference on High-Speed Vehicle Science and Technology (HiSST), 2022*.

Conference paper Monal Patel and Salvador Navarro-Martinez. "Effects of Free Stream Perturbations Passing Through Shocks in Thermochemical Nonequilibrium". *32nd International Symposium on Shockwaves (ISSW32), 2019*.

Presentations

2022 "Direct Numerical Simulation of Hypersonic Flows Around Complex Geometries" at 2nd International Conference on High-Speed Vehicle Science and Technology (HiSST), Bruges, Belgium.

2019 "Effects of Free Stream Perturbations Passing Through Shocks in Thermochemical Nonequilibrium" at 32nd International Symposium on Shockwaves (ISSW32), Singapore

2019 "Hypersonic Flows with Immersed Boundary Method" at 16th International Planetary Probes Workshop (IPPW), Oxford, UK.

Teaching, Supervision and Outreach

2020-2021 **Third-year Thermodynamics course graduate teaching assistant**
• Supported students (~ 160) in weekly problem sheets and course understanding.

2018-2020 **Second year Thermofluids laboratory demonstrator**
• Delivered three-hour structured sessions to groups of 16-20 students (total ~ 160 students).
• Designed a virtual laboratory approach in delivery, suitable for remote learning during Covid-19.

2018-2019 **Master's project co-supervision**
• Initiated, and prepared project scope and objectives. Also, supported the student with bi-weekly meetings.
• Thesis: Supersonic surface plume-surface interactions in planetary landing

2014-2018 **Science, Technology, Engineering and Maths (STEM) ambassador**
• Demonstrated fun science to local primary school students every quarter.

2012-Current **Private tutor**
• Teaching GCSE and A-level Mathematics, Physics and Chemistry, cumulative over 400 hours.

Professional development

2022 - Now **Machine learning courses**
• Completing Stanford University Online CS229: Machine Learning
• Completed Coursera Deep Learning Specialization: Neural Networks and Deep Learning

2022 **Machine learning for PDEs workshop, Mathematics department, Imperial college London**
• Gained an overview of machine learning methods to solve high-dimensional, non-linear partial differential equations (PDEs).

2020 **International High Performance Computing Summer School**
• Attended talks on workflow tools, software engineering, scientific visualization, performance analysis and optimization, big data analytics and deep learning.

2019 **International Planetary Probe Workshop Short Course: Ice Giants**
• Learnt about solar system formation and evolution, giant planets and planetary atmospheres, in-situ exploration of planetary atmospheres including science and instrumentation, technology requirements, and concepts for ice giant entry probe missions.

Awards and Achievements

2021 Imperial College Exploration Board Grant (£600) - Three week science communication expedition to Romania.

2019 City and Guilds Association Postgraduate Travel Grant (£500)

2018 Imperial College Exploration Board Grant (£600) - Three week research expedition to Iceland.

2018 EPSRC Doctoral Training Partnership (DTP) Grant (£65,000)

2017 Deep Science Ventures entrepreneurial competition winner - pitched solution for small satellite radiation shielding solution at Hello Tomorrow Global Conference in Paris. Currently, an operational start-up company.

Leadership and positions of responsibility

2022 Volunteer coach to high school pupils from disadvantaged backgrounds with Coach Bright Charity.

2019-2020 Departmental PhD representative - Organised inter-departmental monthly seminars.

2015-2018 Institution of Mechanical Engineering (IMechE) Greater London Region Young Members Panel - Organised networking tours with local (London) engineering firms for students.

2015-2016 Treasurer, Imperial College Baseball Society - Managed a yearly budget of $\sim$ £3000.

Skills and Interests

Software
- Advanced: Python, Fortran, GitHub, Solidworks
- Intermediate: C++, Unix shell (bash), Linux
- Beginner: Jax

Communication languages
- Native: English
- Fluent: Gujarati and Hindi

Interests Brazilian jiu-jitsu, ultimate frisbee, cricket, badminton, squash, hiking, piano