

Investigation of airflow developing in the built environment by observational data and laboratory experiments

Keywords: *Fluid Mechanics; Laboratory experiments; Energy optimisation; Built Environment.*

Overview:

Applications are invited for a PhD scholarship at Imperial College London. The successful applicant will run laboratory experiments and analyse observational data to advance the understanding of indoor airflows. The candidate will be based in the Department of Civil and Environmental Engineering and benefit from access to the state-of-the-art Hydrodynamic Laboratory, supervised by Dr Costanza Rodda and Dr Henry Burridge.

Project details:

Managing energy consumption while maintaining indoor air quality is an increasingly important challenge in the design and operation of our buildings in the face of climate change and net-zero. Ventilation plays a key role in regulating temperature and removing pollutants, but the associated heating/cooling load is also a significant contributor to global energy consumption. The indoor airflow patterns created by air conditioning and heat sources in our buildings are still not fully understood, presenting a major obstacle to reliable predictions and optimised building performance.

This PhD project will enhance our understanding of these indoor airflows both using detailed data from reduced-scale laboratory experiments and data measured in operational buildings. Operational building datasets will be analysed to get insights about airflow development realised within indoor spaces. The laboratory experiments will provide complimentary physical insights into the dynamics of these indoor airflows. In particular, laboratory experiments will allow us to develop fundamental understanding, such as the impact on in-room mixing and the efficiency gained from combining localised sources and differentially heated floors or walls. The joint analysis of the datasets will culminate in modelling of airflows within indoor spaces capable of enabling better predictions and optimisation of our buildings.

Requirements:

- *An Upper Second-Class Honours Degree (or international equivalent) in engineering, mathematics, physics or closely related disciplines*
- *A Masters level degree qualification, e.g. MSc/Meng/MPhil.*
- *Excellent English communication skills, including strong writing abilities*

How to apply:

Applicants are recommended to contact Dr Costanza Rodda (c.rodde@imperial.ac.uk) for further details, informal discussions and information about the project.

Funding:

The studentship will provide funding for 3.5 years from October 2025, including tuition fees at the level of Home students and a living stipend. This funding can also be used to partly support an international student.