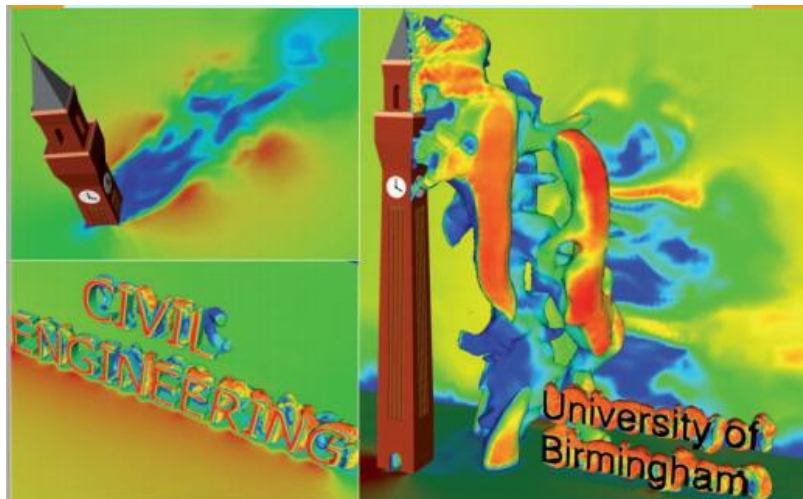


Fluid Mechanics

Fluid Mechanics research builds on a fundamental understanding of the motion of fluids in order to address a variety of real world problems. In this context, “fluids” range from water and air, through to slurries, waves and weather, and this allows us to study diverse topics such as wind-induced forces on buildings, vehicle aerodynamics, non-Newtonian fluids in water treatment works, and the behaviour of waves on a beach. We have even been known to predict the motion of flight of cricket balls*! Our research is grouped into two themes - wind engineering and hydraulic engineering - and it ranges from blue skies, theoretical thinking right through to highly applied projects, such as modelling the flow of air around the university’s famous clock tower.

* C.J. Baker, 2010 “The calculation of cricket ball trajectories”. Journal of Mechanical Engineering Science, Proceedings of the IMechE C, 224, 1947-1958, DOI: 10.1243/09544062JMES1973



Research activities in Wind Engineering

[Open all sections](#)

The discipline of Wind Engineering grew out of the activities of a number of research establishments around the world in the 1950’s and 1960’s, including the National Physical Laboratory in Teddington and the Building Research Establishment in Watford. In its broadest sense the term Wind Engineering refers to the positive and negative effects that wind can have on the built and natural environment.



Wind engineering at Birmingham spans a variety of interests and includes:

- **train aerodynamics** ([/research/activity/railway/research/aerodynamics/index.aspx](#));
- wind energy;
- non-synoptic storm simulation;
- climate change;
- agricultural meteorology.

Professor Chris Baker ([/staff/profiles/civil/baker-chris.aspx](#)), **Professor Charalampos Baniotopoulos** ([/staff/profiles/civil/baniotopoulos-charalampos.aspx](#)), **Professor Mark Sterling** ([/staff/profiles/civil/sterling-mark.aspx](#)), **Dr Hassan Hemida** ([/staff/profiles/civil/hemida-hassan.aspx](#)), **Dr Andrew Quinn** ([/staff/profiles/civil/quinn-andrew.aspx](#)) and **Dr Pedro Martinez-Vazquez** ([/staff/profiles/civil/martinez-vazquez-pedro.aspx](#)) combine to create an experienced research group, with expertise covering physical

modelling, numerical modelling and full-scale work.

Notable recent and current projects include:

- **Downburst dynamics and the implications for engineering structures** (<http://gow.epsrc.ac.uk/NGBOViewGrant.aspx?GrantRef=EP/J008281/1>);
- Wind measurements on structures and buildings;
- **The flight of windborne debris** (<http://gow.epsrc.ac.uk/NGBOViewGrant.aspx?GrantRef=EP/F03489X/1>);
- **The measurement of train aerodynamic phenomena in operating conditions** (<http://gow.epsrc.ac.uk/NGBOViewGrant.aspx?GrantRef=EP/I03842X/1>);
- **Numerical simulation of the flow around goods vehicles** (</research/activity/railway/research/aerodynamics/cfd/nainesh-patel-large-eddy-simulations.aspx>);
- **Simulating the flow around freight trains** (</research/activity/railway/research/aerodynamics/cfd/dominic-flynn-numerical-flow.aspx>);
- **Aerodynamics of freight trains** (</research/activity/railway/research/aerodynamics/freight-trains.aspx>);
- The effect of wind on agriculture and yield;
- Innovative design of connections in wind turbine towers;
- Wind energy structures designed using High Strength Steel;
- wind energy structures.





Research activities in Hydraulic Engineering

We have a long history of high quality hydraulic engineering research at Birmingham and have established a unique database of velocity and boundary shear measurements ([Flow Database \(/research/activity/civil-engineering/archive/short-term/floods/flowdata/index.aspx\)](http://research/activity/civil-engineering/archive/short-term/floods/flowdata/index.aspx)) that are free to download to calibrate numerical models. This is a field in which [Professor Mark Sterling \(/staff/profiles/civil/sterling-mark.aspx\)](http://staff/profiles/civil/sterling-mark.aspx), [Dr Hassan Hemida \(/staff/profiles/civil/hemida-hassan.aspx\)](http://staff/profiles/civil/hemida-hassan.aspx) and [Dr Andrew Quinn \(/staff/profiles/civil/quinn-andrew.aspx\)](http://staff/profiles/civil/quinn-andrew.aspx) are expert.

Current projects range from the fundamental to the highly applied, and include:

- [investigating new approaches to estimating flood discharges via surface videography and 2D & 3D modelling \(/http://gow.epsrc.ac.uk/NGBOViewGrant.aspx?GrantRef=EP/E002250/1\)](http://gow.epsrc.ac.uk/NGBOViewGrant.aspx?GrantRef=EP/E002250/1) ;
- experimental investigations of the flow structures and turbulence characteristics of flow over heterogeneous beds;
- lateral velocity and boundary shear prediction of vegetated channels and rivers;
- optimisation of anaerobic digestion mixing processes;
- [future energy-environment dependencies of the infrastructure network \(FEED-IN\) \(/Documents/college-eps/civil/research/phd-webpage-daniel-murant.pdf\)](http://Documents/college-eps/civil/research/phd-webpage-daniel-murant.pdf).



Opportunities relevant to this theme

This active research group is always looking for good postgraduate research candidates. For general enquiries, please contact us (details below) or search on the [Postgraduate Research Degrees web pages \(/schools/civil-engineering/postgraduate/research-degree.aspx\)](http://schools/civil-engineering/postgraduate/research-degree.aspx).

We also offer taught postgraduate programmes, including:

- [MSc/PG Diploma/PG Certificate in Water Resources Technology and Management \(/postgraduate/courses/taught/civil-engineering/water-resources-technology-management.aspx\)](http://postgraduate/courses/taught/civil-engineering/water-resources-technology-management.aspx)
- [MSc/Diploma/PG Certificate in Railway Systems Engineering and Integration \(/postgraduate/courses/taught/civil-engineering/railway-systems-engineering.aspx\)](http://postgraduate/courses/taught/civil-engineering/railway-systems-engineering.aspx)
- [MSc/PG Diploma/PG Certificate in Civil Engineering \(/postgraduate/courses/taught/civil-engineering/civil-engineering.aspx\)](http://postgraduate/courses/taught/civil-engineering/civil-engineering.aspx)
- [MSc/Diploma/PG Certificate in Civil Engineering and Management \(/postgraduate/courses/taught/civil-engineering/civil-engineering-management.aspx\)](http://postgraduate/courses/taught/civil-engineering/civil-engineering-management.aspx)

Staff in the Fluid Mechanics group

- [Professor Chris Baker \(/staff/profiles/civil/baker-chris.aspx\)](http://staff/profiles/civil/baker-chris.aspx)
- [Professor Charalampos Baniotopoulos \(/staff/profiles/civil/baniotopoulos-charalampos.aspx\)](http://staff/profiles/civil/baniotopoulos-charalampos.aspx)
- [Professor John Bridgeman \(/staff/profiles/civil/bridgeman-john.aspx\)](http://staff/profiles/civil/bridgeman-john.aspx) (Director of Research, School of Civil Engineering)
- [Dr Hassan Hemida \(/staff/profiles/civil/hemida-hassan.aspx\)](http://staff/profiles/civil/hemida-hassan.aspx)
- [Dr Pedro Martinez-Vazquez \(/staff/profiles/civil/martinez-vazquez-pedro.aspx\)](http://staff/profiles/civil/martinez-vazquez-pedro.aspx)
- [Professor Mark Sterling \(/staff/profiles/civil/sterling-mark.aspx\)](http://staff/profiles/civil/sterling-mark.aspx) (head of group)

Enquiries to

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For postgraduate taught courses and MScs, please contact

