PhD Project(s) in Aeroacoustics

Project description
Various projects are available in the field of aeroacoustics or flow-induced noise (a mixture of acoustics, fluid dynamics and aerodynamics). Flow-induced noise occurs wherever there is unsteady fluid flow, which is just about everywhere, and must be controlled to produce efficient technology and reduce environmental noise pollution. PhD project topics in aeroacoustics include:

Bluff body flow dynamics and noise generation
Finite wall-mounted cylinders (FWMCs) in cross flow occur frequently in engineering and are a source of flow-induced noise. Wind turbine masts, submarine appendages, high-speed rail pantographs and aircraft landing gear are some contemporary examples. This project will examine the aerodynamic characteristics and noise generation of FWMCs with circular or trapezoidal cross-section and a range of length to diameter/width ratios.

Owl-inspired airfoil noise control in complex turbulence
A significant source of environmental noise pollution is turbulence-airfoil interaction noise produced by aeroengine fans, wind turbine blades, drones and marine propellers. This project aims to reduce turbulence-airfoil noise using passive leading-edge devices inspired by the wing and feather structure of silent-flying owls. It will investigate the use of serrations and porosity at the airfoil leading edge and how these devices interact with ideal (homogeneous, isotropic) and complex (non-homogeneous, anisotropic) turbulent in-flows.

Noise generation from surface mounted objects in pressure gradient flows
In real-world applications, surface mounted objects (steps, bluff bodies, streamlined geometries) often encounter boundary layers with various pressure gradients. For example, airfoil shaped control surfaces located at the stern of marine vessels are immersed in the thick turbulent boundary layer that forms on the hull and is subject to afterbody adverse pressure gradients. This project aims to understand the flow physics and noise generation mechanisms for these scenarios.

Ideal candidate
No particular prior experience is necessary, but the ideal candidate will have interest in acoustics, fluid mechanics and/or aerodynamics. During this project, the student will use anechoic wind tunnels, perform acoustic testing and take steady and unsteady surface pressure, hot-wire anemometry and particle image velocimetry measurements.

About the Flow Noise Group
You will be joining the Flow Noise Group. We are a large and lively team of academics, postdocs, postgraduate and honours students. We have strong links with academia, government and industry which provides endless inspiration for new research and the provision of high-quality education.

Supervision Team
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