

# Quieter Wind Turbine through Integrated Aero-acoustic Simulation

The project aims to develop and validate an integrated rotor simulation package with the state-of-the-art aero-acoustic model that can be utilized in rotor design and control for quieter wind turbine technology. The dominant aerodynamically generated noise for large wind turbines will be modelled and studied.

The research will address the key wind turbine aero-acoustic noise generation mechanisms including RPM, blade-tower interaction, airfoil broadband noise, blade design such as swept tip, rotor control inputs, and atmospheric turbulence. Wind turbine noise has strong coupling with aerodynamics and rotor dynamics including elastic modes necessitating the use of integrated wind turbine simulation that includes both wind turbine aerodynamic performance and structural dynamics. Thus the wind turbine noise reduction can be achieved with rotor design and control optimization while considering both wind turbine performance and noise at the same time.

The ultimate goal is to develop and demonstrate how the state-of-art integrated aeroacoustic modelling/simulation technology with validation can be utilized for quieter wind turbine design and rotor control process, so that the noise generated from a wind turbine can be reduced and controlled by an improved installation.

This is an Engineering project. Some experience in Vibro acoustics is desirable but not essential

1. M. Bell, R. Cooper, G. Houston and **J. Wang**, "Numerical modelling of Acoustic Sources, 2010 RAeS Aerodynamics Conference Applied Aerodynamics: Capabilities and Future Requirements" Tuesday 27 – Wednesday 28 July 2010 University of Bristol, Queens Building, University Walk, Bristol, BS8 1TR, UK
2. R. Gault, R. Cooper, O. David-West **J. Wang** and M. Tournour, "NEAR-FIELD ACOUSTIC HOLOGRAPHY APPLIED TO A LOUDSPEAKER PSEUDO ENGINE SOURCE", The sixteenth International Congress on Sound and Vibration, Krakow, 5-9 July 2009
3. R. Gault, R. Cooper, M. **J. Wang** and M. Tournour, "A COMPARATIVE STUDY OF NEAR-FIELD ACOUSTIC HOLOGRAPHY AND INTENSITY TECHNIQUES APPLIED TO A LOUDSPEAKER SOURCE", The sixteenth International Congress on Sound and Vibration, Krakow, 5-9 July 2009
4. J. Chen, **J. Wang**, M. Cassidy, "Experiment Study and Design of Moveable Partition Wall", 3rd International Conference on Integrity, Reliability and Failure, July, 2009, Porto, Portugal, Jian Chen has been invited as a co-chair

DOS Professor J Wang, Dr P Barrington, Dr H Mirzaii, Dr K Volkov,