

TORQUE 2022 Themes

Wind and Wind Farms

Keywords: resource, forecasting, wakes, mesoscale, microscale, turbulence

This theme is concerned with the wind conditions, intra- and inter-farm effects. This includes: temporal and spatial variation of the wind both onshore and offshore, modelling and measurement of the wind resource near the ground and at altitude, long-term climatic influences on the wind, wake effects, interactions between wind farms, impacts of wind farm clusters, wind forecasting.

Measurement and Testing

Keywords: measurement, lidar, sodar, radar, remote sensing, satellite, testing, experimentation, wind tunnel, wave tank

This theme is concerned with innovations in technology associated with measuring the wind and other meteorological quantities associated with wind resource assessment. This theme is also concerned with experimental and testing technology including the use of wind tunnels and wave tanks.

Turbine Technology

Keywords: turbine, materials, modelling, measurement, aerodynamics, aeroelastics, aeroacoustics, foundations

This theme is concerned with all aspects of the wind turbine including: blades, rotor, hub, nacelle, drive train, yaw and pitch, tower, foundations, etc. It also includes different types of turbine, e.g. upwind and downwind, horizontal and vertical axis designs. Research on measurements and modelling (e.g. aeroelastics, aeroacoustics) related to the design and behaviour of all types of conventional turbine is part of this theme.

Floating Wind

Keywords: aero-hydrodynamics, fluid structure interactions, moorings, floating structures, prototype testing, floating-specific system engineering and logistics

This theme is specifically related to the challenge of developing floating offshore wind turbines including: the hydrodynamics of platforms, wind tunnel/wave tank hybrid testing and full-scale prototype testing, the coupling between rotor aerodynamics and platform motion and impact on control, innovative floating foundation types, floating-specific installation methods, and numerical modelling at all stages in the design process.

Artificial Intelligence, Control and Monitoring

Keywords: artificial intelligence, control, monitoring, loads, performance, fatigue, simulation, sensors, actuators, damage, reliability

This theme is specifically related to the control of turbines to manage loads, optimise performance and provide grid services including the use of artificial intelligence. This theme also includes aspects of monitoring related to operations and maintenance including measurement and modelling.

Future Wind

Keywords: airborne wind energy, multi-rotors, secondary rotors, unconventional power transmission, hybrid systems

This theme is specifically aimed at research into new and novel wind energy harvesting technology including: airborne wind energy systems, multi- and secondary rotor technology, turbines with unconventional power transmission (e.g. hydraulic), hybrid designs (e.g. wind-wave, wind-wind), etc.

Systems Design and Multi-Fidelity/Multi-Disciplinary Modelling

Keywords: MDAO, systems, holistic design, uncertainty quantification, optimisation, multi-fidelity, multi-disciplinary

This theme is concerned with the holistic design, operation and control of wind turbines and wind farms. It includes multi-disciplinary design, analysis and optimisation (MDAO) and uncertainty quantification as applied to wind energy applications. This theme also is concerned with multi-fidelity modelling and analysis and multi-disciplinary modelling and analysis.

Smaller Wind Turbines

Keywords: small wind turbines, ducted turbines, cross-axis wind turbines, wind-induced energy harvesting, developing countries, distributed generation

This theme is concerned with the development and application of smaller wind power technology (less than around 150kW rated power) more suitable for distributed power generation including the development of novel small wind turbines. The theme deals with applications in the built environment as well as remote applications, distributed wind power and developing countries.