NAWEA 2013 Symposium, Boulder, CO

2A: Wind Energy Science and Engineering II Session Summary and Highlights

Chairs: Takis Chaviaropoulos, Javier Sans Rodrigo, Scott Schreck, David Wood
Speakers: Emmanuel Branlard, DTU, HUI Hu, Iowa State University, Andrew Magstadt, University of Wyoming, Richard Stevens, Johns Hopkins University, Lance Manuel, University of Texas

Emmanuel Branlard (DTU) gave a presentation entitled "Vortex Wake Models with Application to Yawed Rotor". This analytical work admitted progressively greater degrees of complexity for mathematical wake models, and thus relaxed some key restrictions on existing wake models used in connection with BEM methods. This approach furnished insights regarding physical effects currently not modeled via BEM, and pointed out the advantages of addressing these shortcomings. In a talk entitled "Wind Turbine Aeromechanics and Interferences among Multiple Turbine in Onshore and Offshore Wind Farms"

Hui Hu (Iowa State U.) described recent experiments involving a scaled array of three wind turbines in a large-scale atmospheric boundary layer wind tunnel. Measurements of rotor power and loads, along with PIV imaging of flow field structures, were used to better understand the physics of wake flow field structures and wake interference effects.

Andrew Magstadt (U. of Wyoming) presented a talk entitled "Aeroelasticity in Dynamically Pitching Wind Turbine Blades", regarding studies aimed at comprehending the effects of structural compliance on the unsteady aerodynamic response of a pitching blade section. This wind tunnel experiment drove a two-dimensional blade section in a sinusoidal pitch motion, using a linkage that permitted torsional elasticity. The dynamically stalled flow fields were characterized via surface pressure data and PIV images.

Richard Stevens (Johns Hopkins U.) described LES computations that simulated interactions between several wind plant layouts and the atmospheric boundary layer in "Large Eddy Simulation Studies of Average Power Output in Large Wind Farms: Effects of Wind Farm Length and Turbine Placement". Wind plant layouts with 10 or more turbine rows were simulated, for varying lateral turbine offsets between adjacent rows. Results were shown to have implications for optimal wind plant power output.

A talk entitled "Analysis of the Evolving Environment and Loads on an Offshore Wind Turbine during a Simulated Hurricane" was presented by **Lance Manuel (U. of Texas)**. In this work, a hurricane scenario was simulated with a fully coupled atmospheric-wave-ocean model, for different turbine control strategies, wave kinematics, and turbulence characteristics. This research was aimed at assessing the response of 5 MW monopile-supported offshore wind turbines subjected to hurricane inflow conditions.