

Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Spatial characterization of the turbulent structure of a model wind turbine: high speed PIV measurements JIAN SHENG, Texas Tech Univ., LEONARDO CHAMORRO, SEUNG-JAE LEE, ROGER ARNDT, FOTIS SOTIROPOULOS, U. of Minnesota — Wind turbine wakes are complex flow structures that are modulated by the wind turbines and the characteristics of the approach flow, among others. Determining and quantifying the dominating processes that modulate their behavior is essential to improve wind farm design. High speed Particle Image Velocimetry was used to characterize the temporal and spatial features of a model wind turbine wake in their axis of symmetry in the near and far wake field. The model turbine was placed in a boundary layer flow developed in a wind tunnel under neutrally stratified conditions. The high speed measurements allowed us to determine the evolution of a range of coherent structures and their interactions with the surrounding flow. Multi-correlations and spectra as well as the spatial distribution of turbulence quantities provide relevant information on the key turbulent mechanisms that modulate a turbine wake and regulate turbulent transport.

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Date submitted: 10 Aug 2012

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