

Abstract Submitted
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On the Evolution of the Integral Length Scale in the Wake of Wind Turbines and within Wind Farms HUIWEN LIU, Hohai University, YAQING JIN, IMRAN HAYAT, LEONARDO P. CHAMORRO, University of Illinois at Urbana Champaign — Wind tunnel experiments were performed to characterize the evolution of integral length scale in the wake of a single turbine, and around wind farms. Hotwire anemometry was used to obtain high-resolution measurements of the streamwise velocity fluctuation at various locations. Negligible and high freestream turbulence levels were considered in the case of single turbine. The integral length scale along the rotor axis is found to grow nearly linearly with distance independent of the incoming turbulence levels, and appears to reach the incoming level in the high turbulence case at about 35-40 rotor diameters downstream. In the wind farm, results suggest that the distribution of integral length scale can be roughly described by a power-law growth with distance within consecutive turbines. Approximately past the third row, the integral length scale appears to reach equilibrium of the spatial distribution.

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