

Abstract Submitted
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Velocity Data in a Fully Developed Wind Turbine Array Boundary Layer JOHN TURNER, MARTIN WOSNIK, University of New Hampshire — Results are reported from an experimental study of an array of porous disks simulating offshore wind turbines. The disks mimic power extraction of similarly scaled wind turbines via drag matching, and the array consists of 19x5 disks of 0.25 m diameter. The study was conducted in the UNH Flow Physics Facility (FPF), which has test section dimensions of 6.0 m wide, 2.7 m high and 72.0 m long. The FPF can achieve a boundary layer height on the order of 1 m at the entrance of the wind turbine array which puts the model turbines in the bottom third of the boundary layer, which is typical of field application. Careful consideration was given to an expanded uncertainty analysis, to determine possible measurements in this type of flow. For a given configuration (spacing, initial conditions, etc.), the velocity levels out and the wind farm approaches fully developed behavior, even within the maintained growth of the simulated atmospheric boundary layer. Benchmark pitot tube data was acquired in vertical profiles progressing streamwise behind the centered column at every row in the array.

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