

Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Direct power measurements on wind turbine array configurations

DOMINIC DELUCIA, RAUL BAYOAN CAL, Portland State University — The reliability on the power extraction through wind turbines is an area of need given the increasing size of the arrays and energy demand. The turbulence effects generated by wind turbines on the subsequent rows downstream are assessed. Mechanical torque on the hubs of the model wind turbine is recorded and the power is calculated, where the measurements are performed in the Portland State University wind tunnel. Simultaneous torque and angular frequency of the rotors is record at three locations in a 3 by 4 wind turbine array. In this study, the effects due to in-line and staggered configurations are investigated. The base case configuration is a 3 by 4 array with a 6D downstream spacing and a 3D transverse spacing. The results are compared to wind turbine arrays of different spacing configurations. The trends in the data suggest the power is significantly increased when the downstream position are offset by 1.5D in the transverse direction not only for subsequent turbines but also when the turbines are staggered.

Dominic DeLucia
Portland State University

Date submitted: 03 Aug 2012

Electronic form version 1.4