Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Influence of Spatial Variations on the Flow Field and Power Production of a Model Wind Farm[1] ANGELISSE RAMOS, NICHOLAS HAMILTON, DOMINIC DELUCIA, RAÚL BAYOÁN CAL, Portland State University — Wind tunnel experiments of a 4 × 3 model wind turbine array are carried out to understand impact on the flow field and turbulence statistics due to the changes in turbine spacing. Stereo particle Image Velocimetry (SPIV) is used to obtain measurements in dual planes, fore and aft of wind turbine models in the centerline of the array. Variations in turbulence statistics are assessed by altering the streamwise and spanwise spacing. Spacing schemes tested include permutations of streamwise spacing, $S_x = [3D, 6D]$, and spanwise spacing, $S_z = [1.5D, 3D]$, where D is the rotor diameter. Quantities in the mean kinetic energy equation are analyzed under these variations including the Reynolds stress tensor, $\langle u_i u_j \rangle$, kinetic energy flux, $-\langle uv \rangle U$, and turbulence production, $-\langle uv \rangle \partial U/\partial y$. Furthermore, the mechanical power is measured for these turbines reflecting the influence of spatial variations. The analysis has consequences on land use *versus* power output.

[1]National Science Foundation: ECCS-1032647

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Date submitted: 02 Aug 2013 Electronic form version 1.4