## Abstract Submitted for the DFD12 Meeting of The American Physical Society

Experimental study of flow around scaled wind turbine arrays¹ RAMIRO CHAVEZ ALARCON, B.J. BALAKUMAR, FANGJUN SHU, New Mexico State University — An array of scaled model wind turbines, designed using blade element momentum theory, were investigated in a low-speed wind tunnel under uniform laminar inflow conditions. To investigate the influence of neighbor wind turbines, a 2D particle image velocimetry (PIV) system was used to measure the flow field in the wake of the turbines. It is found that flow in the wake of the turbine is axisymmetric about the turbine axis, and is not dependent on the blades orientation. A detailed dataset containing wake structure variations including velocity deficit and Reynolds stresses was obtained and compared with previously obtained data corresponding to a single wind turbine. The power extracted by a single wind turbine under the influence of the array was obtained from the velocity deficit observed at the wake and compared with the power obtained from torque sensor measurements. The complete investigation is compared with previously obtained data corresponding to a single wind turbine.

 $^1\mathrm{Supported}$  by Los Alamos National Laboratory's LDRD program through Grant  $\#~20100040\mathrm{DR}.$ 

Fangjun Shu New Mexico State University

Date submitted: 09 Aug 2012 Electronic form version 1.4