Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

**The wake of a single vertical axis wind turbine** DANIELLE A. BARSKY, MEGAN C. LEFTWICH, George Washington University — The purpose of this study is to measure the wake of a Windspire vertical axis wind turbine (VAWT). In recent years, research on VAWTs has increased due to various potential advantages over the more common horizontal axis wind turbines (HAWTs). Unlike very large HAWTs, moderately sized–and virtually silent–VAWTs can be placed in urban and suburban regions where land space is limited. To date, many VAWT studies have assumed that the turbine has the same aerodynamic structure as a spinning cylinder despite a significant increase in geometric complexity. This experiment attempts to understand the fundamental wake structure of a single VAWT (and compare it to the wake structure of a spinning cylinder). In this experiment, a scaled-down VAWT is placed inside a wind tunnel under a controlled laboratory setting. A motor rotates the scale model at a constant angular speed. Stereo particle image velocimetry (PIV) is used to visualize the wake of the turbine and image processing techniques are used to quantify the velocity and vorticity of the wake.

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Date submitted: 31 Jul 2013 Electronic form version 1.4