

Abstract Submitted  
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**The effects of Reynolds number, tip speed ratio, and solidity in VAWTs** COLIN PARKER, ALLEN SCHULT, MEGAN C. LEFTWICH, George Washington University — The wakes of several scale models of vertical axis wind turbines (VAWTs) are investigated in a wind tunnel using particle imaging velocimetry (PIV). The tip speed ratio, Reynolds number, and solidity (chord to diameter ratio) is varied to see effect each parameter. The solidity is changed by varying the chord length of a three blade turbine of constant diameter. The range of parameters (Reynolds number and tip-speed ratio) investigated, closely matches those of full size turbines. Time averaging behind the turbines shows the asymmetry in wake. A more complete picture of the wake is seen using phase averaging by syncing the imaging to the position of the turbine. These results show a cycle of structures developing on the blades and then being shed into the wake. Imaging is done at the midplane of the turbine from upstream of the turbine back into the wake. Additionally a vertical plane behind the center of the turbine is used to measure the horizontal components in the wake.

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