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Flow measurement behind a pair of vertical-axis wind turbines COLIN M. PARKER, RAYMOND HUMMELS, MEGAN C. LEFTWICH, The George Washington University — The wake from a pair of vertical-axis wind turbines (VAWTs) is measured using particle imaging velocimetry (PIV). The VAWT models are mounted in a low-speed wind tunnel and driven using a motor control system. The rotation of the turbines is synced using a proportional controller that allows the turbine's rotational position to be set relative to each other. The rotation of the turbines is also synced with the PIV system for taking phase averaged results. The VAWTs are tested for both co- and counter-rotating cases over a range of relative phase offsets. Time averaged and phase averaged results are measured at the horizontal mid-plane in the near wake. The time-averaged results compare the bulk wake profiles from the pair of turbines. Phase averaged results look at the vortex interactions in the near wake of the turbines. By changing the phase relation between the turbines we can see the impact of the structure interactions in both the phase and time averaged results.

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