Abstract Submitted
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Anisotropy tensor invariant assessment for counter-rotating wind turbine wakes[1] NICHOLAS HAMILTON, RAÚL BAYOÁN CAL, Portland State University — Model wind turbine arrays were tested in a suite of wind tunnel experiments to determine the wake-to-wake interaction and mixing for different counter-rotation schemes of turbine rotors. All configurations were comprised of a standard Cartesian arrangement (4×3) of turbines. A uniform rotation scheme formed the control against which were tested row-by-row, column-by-column, and checkerboard counter-rotation configurations. Stereo PIV measurements were made immediately upstream and downstream of both entrance and exit row turbines in the center of the wind tunnel. The full Reynolds stress anisotropy tensor, a_{ij}, was calculated for all measurement locations showing effects of sense of rotation of rotor blades on turbulent stresses. The invariants of the anisotropy tensor were calculated and compared further demonstrating the effects of rotation and further characterizing the turbulence within a wind turbine canopy layer. Results have implications on return-to-isotropy models used in wind turbine array simulations.

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