Anisotropic character and low dimensional representations of a model wind turbine array versus an array of porous disks ELIZABETH CAMP, RAÚL CAL, Portland State University — A model turbine array is compared to an array of matched stationary porous disks via stereo particle image velocimetry. Wind tunnel measurements bracket the center turbine in the fourth row of a 4×3 model array. The invariants of the normalized Reynolds stress anisotropy tensor and the Proper Orthogonal Decomposition (POD) are employed to characterize the similarities and differences between the near as well as the far wake of the rotor and disk cases. The rotor case illustrates a greater degree of large scale spatial organization and more uniform values of the anisotropy stress invariants than the disk case. The anisotropic invariants of the POD modes are also examined in order to determine how the anisotropic character of the flow varies with turbulent kinetic energy content. Results are relevant in the modeling of rotors using a stationary disk parametrization in computational studies focusing on structural response.

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Date submitted: 01 Aug 2017   Electronic form version 1.4