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Higher order moments, structure functions and spectral ratios in near- and far-wakes of a wind turbine array NASEEM ALI, A. ASEYEV, J. MCCRANEY, V. VUPPULURI, O. ABBASS, T. AL JUBAREE, M. MELIUS, R.B. CAL, Portland State University — Hot-wire measurements obtained in a 3 x 3 wind turbine array boundary layer are utilized to analyze higher order statistics which include skewness, kurtosis as well as the ratios of structure functions and spectra. The ratios consist of wall-normal to streamwise components for both quantities. The aim is to understand the degree of anisotropy in the flow for the near- and far-wakes of the flow field where profiles at one diameter and five diameters are considered, respectively. The skewness at top tip for both wakes show a negative skewness while below the turbine canopy, this terms are positive. The kurtosis shows a Gaussian behavior in the near-wake immediately at hub-height. In addition, the effect due to the passage of the rotor in tandem with the shear layer at the top tip renders relatively high differences in the fourth order moment. The second order structure function and spectral ratios are found to exhibit anisotropic behavior at the top and bottom-tips for the large scales. Mixed structure functions and co-spectra are also considered in the context of isotropy.

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