Abstract Submitted
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Inverse structure functions in the canonical wind turbine array boundary layer[1] BIANCA VIGGIANO, MOIRA GION, NASEEM ALI, Portland State University, MURAT TUTKUN, University of Oslo, RAÚL BAYOÁN CAL, Portland State University — Insight into the statistical behavior of the flow past an array of wind turbines is useful in determining how to improve power extraction from the overall available energy. Considering a wind tunnel experiment, hot-wire anemometer velocity signals are obtained at the centerline of a 3 x 3 canonical wind turbine array boundary layer. Two downstream locations are considered referring to the near- and far-wake, and 21 vertical points were acquired per profile. Velocity increments are used to quantify the ordinary and inverse structure functions at both locations and their relationship between the scaling exponents is noted. It is of interest to discern if there is evidence of an inverted scaling. The inverse structure functions will also be discussed from the standpoint of the proximity to the array. Observations will also address if inverted scaling exponents follow a power law behavior and furthermore, extended self-similarity of the second moment is used to obtain the scaling exponent of other moments. Inverse structure functions of moments one through eight are tested via probability density functions and the behavior of the negative moment is investigated as well.

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