Abstract Submitted
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**Grid Sensitivity Analysis of Simulations of a Flow around a Single Rotating Wind Turbine Blade**[1] BRYAN E. KAISER, MICHAEL A. SNIDER, SVETLANA V. POROSEVA, University of New Mexico, ROB O. HOVSAPIAN, Idaho National Laboratory — Design of a wind farm layout with the purpose of optimizing the power outcome requires accurate and reliable simulations of a flow around and behind wind turbines. Such computations are expensive even for a single turbine. To find an optimal set of simulation parameters that satisfies both requirements in simulation accuracy and cost in an acceptable degree, a sensitivity study on how the parameters' variation influences results of simulations should be conducted at the early stage of computations. In the current study, the impact of a grid refinement, grid stretching, and cell shape on simulation results is analyzed in a flow around a single rotating blade utilized in a mid-sized Rim Driven Wind Turbine design (U.S. Patent #7399162) developed by Keuka Energy LLC, and in its near wake. Simulation results obtained with structured and unstructured grids are compared. Industry relies on commercial software for conducting fluid flow simulations. Therefore, STAR-CCM+ software was used in our study. A choice of a turbulence model was made based on our previous sensitivity study of flow simulations over a rotating disk (see M. A. Snider, S. V. Poroseva, AIAA-2012-3146).

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