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Wind Farm Aerodynamic Simulation Using Prescribed and Free-Wake Vortex Methods[1] TEJA DASARI, Xcel Energy, AARON ROSENBERG, Rosenberg Solutions, LLC — We present an analysis of the Graphically Accelerated Vortex Lattice Library (GAVLL) to simulate the aerodynamics of a wind farm. Vortex based methods have been used extensively to simulate the aerodynamics of single turbines. GAVLL extends these methods to allow for the simultaneous aerodynamic simulation of multiple turbines within a single computational domain. This extension allows users to predict the aerodynamic interactions between independent wind turbine rotors which is critical for realistic wind-farm and multi-rotor wind turbine simulations. This work presents a detailed methodology of the approach using both free and prescribed wake models followed by a preliminary validation study. The validation study includes the power output predictions of GAVLL for a single turbine compared with other computational methods as well as experimental data. Building on that, the methodology is scaled to the farm level to predict the total power production of a utility scale wind farm in comparison with field data from a real wind farm. -/a

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