Abstract Submitted
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Coupling the Weather Research and Forecasting (WRF) model and Large Eddy Simulations with Actuator Disk Model: predictions of wind farm power production[1] EDGARDO JAVIER GARCIA CARTAGENA, CHRISTIAN SANTONI, UMBERTO CIRI, GIACOMO VALERIO IUNGO, STEFANO LEONARDI, The University of Texas at Dallas — A large-scale wind farm operating under realistic atmospheric conditions is studied by coupling a meso-scale and micro-scale models. For this purpose, the Weather Research and Forecasting model (WRF) is coupled with an in-house LES solver for wind farms. The code is based on a finite difference scheme, with a Runge-Kutta, fractional step and the Actuator Disk Model. The WRF model has been configured using seven one-way nested domains where the child domain has a mesh size one third of its parent domain. A horizontal resolution of 70 m is used in the innermost domain. A section from the smallest and finest nested domain, 7.5 diameters upwind of the wind farm is used as inlet boundary condition for the LES code. The wind farm consists in six-turbines aligned with the mean wind direction and streamwise spacing of 10 rotor diameters, (D), and 2.75D in the spanwise direction. Three simulations were performed by varying the velocity fluctuations at the inlet: random perturbations, precursor simulation, and recycling perturbation method. Results are compared with a simulation on the same wind farm with an ideal uniform wind speed to assess the importance of the time varying incoming wind velocity.

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