Using Reconstructed POD Modes as Turbulent Inflow for LES Wind Turbine Simulations JORDAN NIELSON, KIRAN BHAGANAGAR, University of Texas San Antonio, VEJAPONG JUTTIJUDATA, Kaetsart University, SIROD SIRISUP, None — Currently, in order to get realistic atmospheric effects of turbulence, wind turbine LES simulations require computationally expensive precursor simulations. At times, the precursor simulation is more computationally expensive than the wind turbine simulation. The precursor simulations are important because they capture turbulence in the atmosphere and as stated above, turbulence impacts the power production estimation. On the other hand, POD analysis has been shown to be capable of capturing turbulent structures. The current study was performed to determine the plausibility of using lower dimension models from POD analysis of LES simulations as turbulent inflow to wind turbine LES simulations. The study will aid the wind energy community by lowering the computational cost of full scale wind turbine LES simulations, while maintaining a high level of turbulent information and being able to quickly apply the turbulent inflow to multi turbine wind farms. This will be done by comparing a pure LES precursor wind turbine simulation with simulations that use reduced POD mod inflow conditions. The study shows the feasibility of using lower dimension models as turbulent inflow of LES wind turbine simulations. Overall the power production estimation and velocity field of the wind turbine wake are well captured with small errors.

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