Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Mesh Dependence on Shear Driven Boundary Layers in Stable Stratification Generated by Large Eddy-Simulation JACOB BERG, Technical University of Denmark, Department of Wind Energy , EDWARD G. PATTON , PETER S. SULLIVAN , National Center for Atmospheric Research — The effect of mesh resolution and size on shear driven atmospheric boundary layers in a stable stratified environment is investigated with the NCAR pseudo-spectral LES model (J. Atmos. Sci. v68, p2395, 2011 and J. Atmos. Sci.v73, p1815, 2016). The model applies FFT in the two horizontal directions and finite differencing in the vertical direction. With vanishing heat flux at the surface and a capping inversion entraining potential temperature into the boundary layer the situation is often called the conditional neutral atmospheric boundary layer (ABL). Due to its relevance in high wind applications such as wind power meteorology, we emphasize on second order statistics important for wind turbines including spectral information. The simulations range from mesh sizes of 64^3 to 1024^3 grid points. Due to the non-stationarity of the problem, different simulations are compared at equal eddy-turnover times. Whereas grid convergence is mostly achieved in the middle portion of the ABL, statistics close to the surface of the ABL, where the presence of the ground limits the growth of the energy containing eddies, second order statistics are not converged on the studies meshes. Higher order structure functions also reveal non-Gaussian statistics highly dependent on the resolution.

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Date submitted: 31 Jul 2017 Electronic form version 1.4