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Large eddy simulation of an urban-type boundary layer SRIHARSHA KANDALA, DIETMAR REMPFER, IIT, Chicago, PAUL FISCHER, ANL, Chicago, CANDACE WARK, IIT, Chicago — Large eddy simulations based on the scale-dependent Lagrangian dynamic model (Meneveau, Phys. Fluids (17), 2005) allow for scale dependence. This is particularly relevant when the filter scale approaches the upper limits of the inertial range, which is typically the case when modeling urban boundary layers. Scale-dependent Lagrangian dynamic models are also known to exhibit favorable dissipation characteristics. In this talk we present the results of a numerical simulation of an urban-type boundary layer described in the talk by Monnier, Neiswander, Wark & Rempfer at the 2007 APS/DFD meeting. The domain consists of 4 rows of 3 cuboids placed in a wind tunnel. The inlet velocity conditions are obtained from hot-wire measurements upstream of the blocks. The flow is simulated using the dynamic Smagorinsky model available with the commercial software FLUENT and the scale-dependent Lagrangian dynamic model available with spectral element code nek5000. These results are compared with the PIV data obtained from the experiments.

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