

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Large eddy simulation of the atmospheric boundary layer above a forest canopy¹ JAHRUL ALAM, Memorial University — A goal of this talk is to discuss large eddy simulation (LES) of atmospheric turbulence within and above a canopy/roughness sublayer, where coherent turbulence resembles a turbulent mixing layer. The proposed LES does not resolve the near wall region. Instead, a near surface canopy stress model has been combined with a wall adapting local eddy viscosity model. The canopy stress is represented as a three-dimensional time dependent momentum sink, where the total kinematic drag of the canopy is adjusted based on the measurements in a forest canopy. This LES has been employed to analyze turbulence structures in the canopy/roughness sublayer. Results indicate that turbulence is more efficient at transporting momentum and scalars in the roughness sublayer. The LES result has been compared with the turbulence profile measured over a forest canopy to predict the turbulence statistics in the inertial sublayer above the canopy. Turbulence statistics between the inertial sublayer, the canopy sublayer, and the rough-wall boundary layer have been compared to characterize whether turbulence in the canopy sublayer resembles a turbulent mixing layer or a boundary layer. The canopy turbulence is found dominated by energetic eddies much larger in scale than the individual roughness elements.

¹Financial support from the National Science and Research Council (NSERC), Canada is acknowledged.

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Date submitted: 31 Jul 2017

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