



Large eddy simulation of canopy flows using Lagrangian dynamic model and comparison with PIV field experimental data

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Canopy turbulence is characterized by momentum transfer through aerodynamic drag of foliage throughout the whole depth of the canopy, which leads to an unstable inflected mean velocity profile and enhances dissipation of turbulent kinetic energy by means of wake-scale eddies. Here we present simulated turbulence structures within and above a corn canopy, using a new-generation large eddy simulation (LES). The LES employs a dynamic Lagrangian subgrid-scale model. The specific arrangement of corn plants is taken into account. The computational results are extensively compared with recent PIV measurements (Zhu et al. 2004) and two previous field experiments by Shaw et al. (1974) and Wilson et al. (1982). The numerical predictions of turbulence statistics and energy spectra are in good agreement with the experimental data.