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Large-Eddy Simulation of Particle Dispersion Inside and Above Plant Canopies YING PAN, MARCELO CHAMECKI, SCOTT ISARD, Pennsylvania State University — Modeling the dispersion of small particles such as pathogenic spores, pollens, and small seeds inside and above plant canopies is important in many applications. Transport of these particles is driven by strongly inhomogeneous, coherent, and non-Gaussian turbulent flows inside the canopy roughness sublayer (the regions extending from ground to about three canopy heights). We develop an LES approach that includes parameterization of plant reconfiguration through a velocity-dependent drag coefficient and yield predictions of turbulence statistics and coherent structures in good agreement with experimental data. Particle dispersion is also validated against experimental data of spore dispersal inside and above a maize field. LES results are used in the development of a simple framework for modeling the particle plume. Characteristics of the particle plume in the near and far fields are studied. Results suggest that the far field plume can be approximated by a simple analytical solution if the fraction of spores that escape the canopy region is known.

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