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Impacts of the Reconfiguration of Flexible Plants on the Structure of Turbulence and Dispersion of Particles YING PAN, National Center for Atmospheric Research, ELIZABETH FOLLETT, Massachusetts Institute of Technology, MARCELO CHAMECKI, Pennsylvania State University, HEIDI NEPF, Massachusetts Institute of Technology, SCOTT ISARD, Pennsylvania State University — The effect of a canopy of sufficient density on the flow can be parameterized as a distributed drag calculated as the product of the square of velocity, the canopy density and a drag coefficient. Field and laboratory experimental data suggest that the reconfiguration of flexible plants leads to a power-law dependence of the drag coefficient on velocity. For large-eddy simulation (LES) resolving the canopy layer, we represent the effect of reconfiguration by modeling the drag coefficient as a constant when velocity is low and a power-law function of velocity when velocity is above a threshold. For a constrained mean vertical momentum flux at the canopy top, changing the power-law exponent (known as the Vogel number) has negligible effects on LES predictions of the total vertical momentum flux. However, skewness of velocity components, the strength of sweeps and ejections and the fractions of vertical momentum flux transported in different event quadrants are highly sensitive to changes in the Vogel number. These changes in the structure of turbulence have profound impacts on the dispersion of particles within and above the canopy.

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