Abstract Submitted
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Three-dimensional hydrodynamics of a suspended cylindrical canopy patch[1] JIAN ZHOU, SUBHAS VENAYAGAMOORTHY, Colorado State Univ — Three-dimensional large eddy simulations (LES) are carried out to determine the local hydrodynamics of a suspended canopy patch impinged by a uniform incident flow. The patches are circular (with bulk diameter D) and are made of rigid circular cylinders (height h and diameter d). Four different patch densities ($\phi = N_c d^2/D^2$) and four different patch aspect ratios ($AR = h/D$) are considered by varying the number of cylinders in the patch (N_c) and the height of the patch (h), respectively. Based on a volumetric-flux budget through the patch surface, the bleeding dynamics inside and in the vicinity of the patch was found to be controlled not only by ϕ, but also remarkably by AR. The relative longitudinal bleeding normalized by the total flux entering the patch ($\hat{Q}_x = Q_x/Q_{influx}$) was observed to be inhibited by increasing ϕ but insensitive to the variation of AR; the relative lateral bleeding ($\hat{Q}_y = Q_y/Q_{influx}$) increases with either increasing ϕ or AR; and the relative vertical bleeding ($\hat{Q}_z = Q_z/Q_{influx}$) increases with increasing ϕ while decreases with increasing AR. However, for patches with a constant ϕ, an increase in AR contributes to enhance the absolute strength of vertical bleeding (Q_z) at the patch free end.

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