Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

The effects of interface deformation of superhydrophobic surface on wall turbulence SHAO-CHING HUANG, JOHN KIM, UCLA — Superhydrophobic surfaces have shown the possibility of achieving substantial skin-friction reduction in wall-bounded turbulent flows. Under the right conditions, the air pockets stably entrapped within the micrograte create an air-water interface, causing an effective slip to the external liquid flow. When the effective slip length reaches a certain range of viscous length scale of the near-wall flow, significant drag reduction is observed in prior studies. We have performed direct numerical simulations of a turbulent channel flow over superhydrophobic surfaces. A mass-preserving immersed-boundary method is developed to resolve the gas-liquid interface and to handle the mixed slip and no-slip surfaces within the Cartesian grids. The computer program is fully parallelized using MPI optimized for execution on supercomputers. Turbulence statistics at various Reynolds numbers obtained from curved interface configurations is compared to those obtained from previous studies using the flat interface assumption. Simulations of a spatially developing boundary layer over superhydrophobic surface will also be presented.

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Date submitted: 31 Jul 2017

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