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Experimental Measurements of Turbulent Drag Reduction Using Ultrahydrophobic Surfaces with Periodic Microfeatures ROBERT DANIELLO, JONATHAN P. ROTHSTEIN, Department of Mechanical and Industrial Engineering, University of Massachusetts, Amherst 01003 USA — The experimental results of fully-developed turbulent channel flow past a series of ultrahydrophobic surfaces will be presented. We have shown previously that these surfaces can produce significant drag reduction in laminar channel flow by supporting a shear-free air-water interface between hydrophobic microridges or microposts. In this talk, we will experimentally demonstrate that it is possible to utilize these micropatterned surfaces as a passive technique for achieving significant drag reduction in fully-developed turbulent flows. Two-dimensional velocity profiles as well as shear and Reynolds stress fields generated from particle image velocimetry will be presented. These measurements clearly demonstrate a reduction in drag along the ultrahydrophobic wall when compared to a smooth surface. Pressure drop measurements along the channel will also be presented. Discussion will include the influence of Reynolds number and surface geometry on the velocity profiles, Reynolds stresses and the resulting drag reduction.

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