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Pressure Drop Measurements for Turbulent Channel Flow over Superhydrophobic Surfaces with Superimposed Riblets RICHARD PERKINS, JOSEPH PRINCE, JULIE VANDERHOFF, DANIEL MAYNES, Brigham Young University — We consider the combined drag reducing mechanisms of riblets and superhydrophobicity. Pressure drop measurements were acquired for turbulent channel flow over riblet surfaces, superhydrophobic surfaces, and surfaces with both drag reducing mechanisms. The riblets were nominally 80 μm tall, 16 μm wide, and spaced with a period of 160 μm. The superhydrophobic structuring was composed of alternating microribs (15 μm tall and 8 μm wide) and cavities (32 μm wide), aligned parallel to the flow. The channel consisted of a control section and a test section comprised of smooth and patterned wafers, respectively. In all cases, the test section walls were structured on top and bottom while the side walls were left smooth. The channel had a hydraulic diameter of 7.3 mm and an aspect ratio of 10:1. Seven pressure ports were precision machined into the walls of both the control and test sections. The pressure drop measurements were acquired simultaneously over both sections to eliminate uncertainty associated with the flow rate. The drag reduction for all test sections was then computed directly and data were obtained over a Reynolds number range of 11000 to 15000.

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