Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Liquid Infused Surfaces in Turbulent Channel Flow[1] MATTHEW FU, YING LIU, HOWARD STONE, MARCUS HULTMARK, Princeton University — Liquid infused surfaces have been proposed as a robust method for turbulent drag reduction. These surfaces consist of functionalized roughness elements wetted with a liquid lubricant that is immiscible with external fluids. The presence of the lubricant creates mobile, fluid-fluid interfaces, each of which can support a localized slip. Collectively, these interfaces yield a finite slip velocity at the effective surface, which has been demonstrated to reduce skin friction drag in turbulent flows. Retention of the lubricant layer is critical to maintaining the drag reduction effect. A turbulent channel-flow facility is used to characterize the drag reduction and robustness of various liquid infused surfaces. Micro-manufactured surfaces are mounted flush in the channel and exposed to turbulent flows. The retention of fluorescent lubricants and pressure drop are monitored to characterize the effects of surface geometry and lubricant properties.

[1]Supported under ONR Grants N00014-12-1-0875 and N00014-12-1-0962 (program manager Ki-Han Kim) and by the Department of Defense (DoD) through the National Defense Science Engineering Graduate Fellowship (NDSEG) Program

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Date submitted: 01 Aug 2016 Electronic form version 1.4