Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

**Effect of Partially Wetted Cavities on Superhydrophobic Friction Reduction** TAE JIN KIM, CARLOS HIDROVO, University of Texas at Austin — Superhydrophobicity refers to the condition of water-surface contact angle larger than 150°. Such microtextured surfaces with low sliding angles(<5°) involve air pockets trapped underneath the water(Cassie state). This leads to a shear-free flow boundary condition and consequential reduction in frictional losses and pumping power requirements. We investigate the effects of partially wetted microtextured trenches on the friction reduction characteristics in microchannel flow. PDMS based superhydrophobic microchannels with sidewall trenches are used to visualize the water-air interface penetration and its effects on friction reduction. Theoretical models based on actual water layer measurements and shear free/no slip boundary conditions on the interface are used to calculate lower/upper bounds of the effective friction factor. These are compared to experimental values determined from pressure and flow rate data. Results suggest the existence of a "start-up" pressure required to overcome capacitance associated with surface tension effects and that friction reduction characteristics of the microchannels are unaffected by partial flooding of the trenches.

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Date submitted: 11 Aug 2011 Electronic form version 1.4