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Friction Reduction in Superhydrophobic Microchannels TAE JIN KIM, CARLOS H. HIDROVO, The University of Texas at Austin — Superhydrophobic surfaces are surfaces with fluid contact angles larger than 150°. Superhydrophobicity can be achieved by means of surface texturing through either a Wenzel or Cassie state. It is widely known, however, that drag reduction is closely related to Cassie state surfaces with low degrees of adhesion and several studies have been widely conducted on the topic. In this research we investigate the effects of surface texturing on superhydrophobic microchannels. Both PDMS and silicon based samples were fabricated and used to experimentally characterize the effects that microtexturing geometry has on the friction reduction behavior. We developed a layered-two-fluid system model to simulate the slip velocity condition and approximate the drag reducing behavior of the microtexturing. A surface energy formulation was also introduced to account for the effects that pressure has on the transition from a Cassie (non-wetting) to Wenzel (wetting) state of the microtexturing. Pressure effects in the wetting of the microtexturing are essential since the flow is driven by a pressure gradient. Experimental results on both friction reduction and pressure induced microtexturing wetting were compared against the models.

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