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Two-Phase Flow Hydrodynamics in Superhydrophobic Channels KIMBERLY STEVENS, JULIE CROCKETT, DANIEL MAYNES, BRIAN IVER-SON, Brigham Young Univ - Provo — Superhydrophobic surfaces have been shown to reduce drag in single-phase channel flow; however, little work has been done to characterize the drag reduction found in two-phase channel flow. Adiabatic, air-water mixtures were used to gain insight into the effect of hydrophobicity on two-phase flows and the hydrodynamics which might be present in flow condensation. Pressure drop in a parallel plate channel with one superhydrophobic wall $(cross-section 0.5 \times 10 \text{ mm})$ and a transparent hydrophilic wall were explored. Data for air/water mixtures with superficial Reynolds numbers from 20-215 and 50-210, respectively, were obtained for superhydrophobic surfaces with three different cavity fractions. Agreement between experimentally obtained two-phase pressure drops and correlations in the literature for conventional smooth control surfaces was better than 20 percent. The reduction in pressure drop for channels with a single superhydrophobic wall were found to be more significant than that for single phase flow. The effect of cavity fraction on drag reduction was within experimental error.

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