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Measurements of drag reduction by SLIPS[1] MOHAMED A. SAMAHA[2], JESSICA SHANG, MATTHEW FU, KAREN WANG, HOWARD STONE, ALEXANDER SMITS, MARCUS HULTMARK, Princeton University — Slippery liquid infused porous surfaces (SLIPS) consist of an omniphobic lubricant impregnated into a micro/nanoscale textured substrate. These surfaces have been shown to repel a wide range of liquids. Several techniques to fabricate such surfaces are available in the literature. Here, we report on drag reduction and slip-length measurements using a parallel plate rheometer. Skin-friction measurements of different working fluids are performed on SLIPS with fluorinated boehmite substrates infused with different lubricants. The measurements are refined by considering the evaporation effect of the working fluids. The experiments are performed for different viscosity ratios, N (viscosity of working fluid to that of the lubricant). The effect of the gap height and strain rate on the drag reduction is also investigated. The results show that drag-reduction behavior is influenced by the viscosity ratio and the lubricant-film thickness. The observed drag reduction exists even for very thin film thicknesses. Furthermore, drag reduction is observed for different working fluids even with those having low surface tension such as ethanol.

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