Abstract Submitted
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Slippery liquid-infused porous surfaces in fully developed pipe flow[1] HAFEEZ SULAIMON, MARCUS LEE, LEO HELLSTRÖM, BRIAN ROSENBERG, Princeton University, ALEXANDER SMITS, Princeton University, Monash University, MARCUS HULTMARK, Princeton University — Slippery liquid-infused porous surfaces (SLIPS) are created by locking a thin layer of viscous lubricating oil into a porous surface that is textured at the micro/nano scale, with resulting omniphobicity. The oil layer lies between the solid boundary and the surrounding flow, with the potential to create a partial-slip condition at the boundary. SLIPS therefore offers a new approach to achieve drag reduction. Here, SLIPS is applied to fully developed pipe flow for Reynolds numbers ranging from 600 to 1.8×10^5. The pipe flow facility consists of two test sections, an untreated and a SLIPS treated section, both 32 diameters long. The two test sections are mounted in series, the first preceded by a 120 diameter long untreated developing section and the second preceded by a 60 diameter long SLIPS treated developing section, to ensure fully developed pipe flow. The effects of SLIPS using oils of different viscosity on the flow resistance is quantified by simultaneously measuring and comparing the pressure drop along the untreated and the SLIPS treated test sections.

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