Abstract Submitted
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Drag on Sessile Drops[1] ANDREW J.B. MILNE, University of Alberta/MIT, BRIAN FLECK, DAVID NOBES, DEBJYOTI SEN, University of Alberta, ALIDAD AMIRFAZLI, York University, UNIVERSITY OF ALBERTA MECHANICAL ENGINEERING COLLABORATION — We present the first ever direct measurements of the coefficient of drag on sessile drops at Reynolds numbers from the creeping flow regime up to the point of incipient motion, made using a newly developed floating element differential drag sensor. Surfaces of different wettabilities (PMMA, Teflon, and a superhydrophobic surface (SHS)), wet by water, hexadecane, and various silicone oils, are used to study the effects of drop shape, and fluid properties on drag. The relation between drag coefficient and Reynolds number (scaled by drop height) varies slightly with liquid-solid system and drop volume with results suggesting the drop experiences increased drag compared to similar shaped solid bodies due to drop oscillation influencing the otherwise laminar flow. Drops adopting more spherical shapes are seen to experience the greatest force at any given airspeed. This indicates that the relative exposed areas of drops is an important consideration in terms of force, with implications for the shedding of drops in applications such as airfoil icing and fuel cell flooding. The measurement technique used in this work can be adapted to measure drag force on other deformable, lightly adhered objects such as dust, sand, snow, vesicles, foams, and biofilms.

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