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Motion and shape of partially non-wetting drops on inclined surfaces BABURAJ A PUTHENVEETTIL, VIJAYA SENTHILKUMAR K, IIT Madras, E.J. HOPFINGER, LEGI-CNRS, IIT MADRAS- LEGI COLLABORATION — We study high Reynolds number (Re) motion of partially non- wetting liquid drops on inclined surfaces using (i) water on Fluoro-Alkyl Silane (FAS) coated glass and (ii) mercury on glass. The high hysteresis (35°) water drop experiments have been conducted for a range of inclination angles $26^\circ < \alpha < 62^\circ$ which give a range of Capillary numbers $0.0003 < Ca < 0.0075$ and $137 < Re < 3142$. For low hysteresis (6°) mercury on glass experiments, $5.5^\circ < \alpha < 14.3^\circ$ so that $0.0002 < Ca < 0.0023$ and $3037 < Re < 20069$. It is shown that when $Re \gg 10^3$ for water and $Re \gg 19$ for mercury, the observed velocities are accounted for by a boundary layer flow model. The dimensionless velocity in the inertial regime, $Ca\sqrt{Re}$ scales as the modified Bond number (Bo_m), while $Ca \sim Bo_m$ at low Re. We show that even at high Re, the dynamic contact angles (θ_d) depend only on Ca, similar to that in low Re drops. Only the model by Shikhmurzaev is consistent with the variation of dynamic contact angles in both mercury and water drops. We show that the corner transition at the rear of the mercury drop occurs at a finite, receding contact angle, which is predicted by a wedge flow model that we propose. For water drops, there is a direct transition to a rivulet from the oval shape at a critical ratio of receding to static contact angles.

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