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Surface and Bulk Oscillations of Sessile Drops: Clearing Up Confusion and Understanding Wind Sheared Drops ANDREW J.B. MILNE, University of Alberta, BEATRIZ DEFEZ GARCIA, Universidad Politecnica de Valencia, MIGUEL CABRERIZO VILCHEZ, Universidad de Granada, ALIDAD AMIRFAZLI, University of Alberta — Sessile drop oscillations are studied in the presence of a shearing airflow, and varying body force. The various possibilities for analysis, (center of mass or drop surface oscillations) are elucidated through presenting a unifying analysis framework based on wavenumber, frequency, and fluid properties. This work examines a range of fluid properties in a single study for the first time. A dispersion relation is found relating the frequency of centroid oscillation and capillary-gravity wave number, depending on the ratio (surface tension/liquid density)$^{1/2}$, drop size$^{-3/2}$ and contact angle. The effects of contact angle are more complex than previously suggested simplifications, or analytic solutions for axisymetric drops and must at present be treated empirically. The growth of sessile drop oscillations is linear at low air velocities and exponential at higher air velocities. This is explained by drawing analogies to drops experiencing a varying body force, and to wind driven capillary-gravity waves on lakes, respectively. Liquid viscosity retards the growth of the waves, and has other important effects.

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