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Drop stability in wind: theory SUNGYON LEE, Texas A&M University — Water drops may remain pinned on a solid substrate against external forcing due to contact angle hysteresis. Schmucker and White investigated this phenomenon experimentally in a high Reynolds number regime, by measuring the critical wind velocity at which partially wetting water drops depin inside a wind tunnel. Due to the unsteady turbulent boundary layer, droplets are observed to undergo vortex-shedding induced oscillations. By contrast, the overall elongation of the drop prior to depinning occurs on a much slower timescale with self-similar droplet shapes at the onset. Based on these observations, a simple, quasi-static model of depinning droplet is developed by implementing the phenomenological description of the boundary layer. The resultant model successfully captures the critical onset of droplet motion and is the first of on-going studies that connect the classical boundary layer theory with droplet dynamics.

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