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Dynamic wetting and hysteresis on superhydrophobic surfaces: an experimental observation of contact line motion ADAM PAXSON, KATHERINE SMYTH, HYUK-MIN KWON, KRIPA VARANASI[1], Massachusetts Institute of Technology — Contact angle and width are sampled at a high frequency to quantify advancing and receding behavior. As the contact angle increases, the contact line moves smoothly along the surface. As the contact angle recedes, instead of approaching a steady value, a stick-slip behavior occurs. The contact line sticks on the micro-pillars and forms capillary bridges, and slips when the bridges are stretched and then ruptured. The frequency of contact angle stick-slip behavior increased with contact line velocity. For the range of velocities tested, contact line velocity is not dependent upon pillar density, and does not appear to have an effect on measured contact angle values. This model of the moving contact line is verified by images captured using multiple methods. First, a silica nanoparticle solution is imaged under high magnification to observe contact line behavior during volume addition and subtraction. Additionally, the contact line of a sliding droplet is imaged with environmental scanning electron microscopy. This paper experimentally establishes for the first time advancing and receding behavior on micro-textured surfaces, and investigates the dependence of this behavior on contact line velocity.

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