Capillary migration of large confined drops in super-hydrophobic wedges

Experiments conducted in the drop tower start with the volume of fluid resting under gravity on a horizontal, hydrophobic surface. A similar surface is held above and just slightly in contact with the droplet as depicted by Fig. 1. Following the release of the experiment and a short re-orientation period, the trailing and leading edge menisci initial locations, identified in Fig. 2 as $X_{o,t}$ and $X_{o,l}$ respectively, are measured by the known geometry of the system. The droplet location is then tracked by these same menisci as a center of mass approximation has not yet been determined. Relevant parameters and fluid properties are given in Table I.

TABLE I. Test parameters (left) and fluid properties (right) for drop tower experiments conducted using distilled water.

Test	V (mL)	α (°)	$X_{o,t}$ (cm)	$X_{o,l}$ (cm)	σ (mN/m)	ρ (kg/m^3)	θ_{static} (°)	μ (mPa s)[1]
1	3	1.2	22.6	27.2	72.15	968.8	151	0.9
2	4	3.8	3.7	6.4				
3	6	3.8	3.6	7.5				

1. Engineering Tool Box

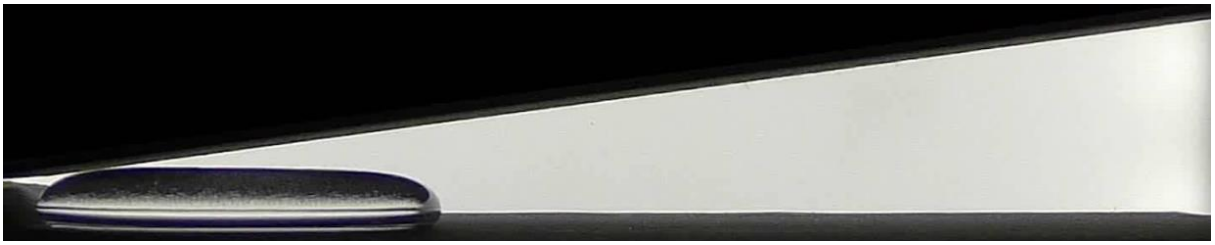

FIG. 1. A droplet of known volume is deposited on a super-hydrophobic surface and held in place by gravity prior to micro-gravity testing.

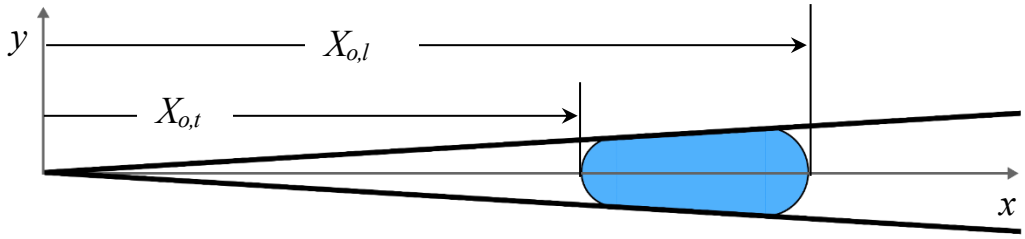

FIG. 2. Immediately following the initiation of the drop test, the droplet reforms into a wedge like shape where the leading and trailing menisci are recorded as $X_{o,t}$ and $X_{o,l}$.