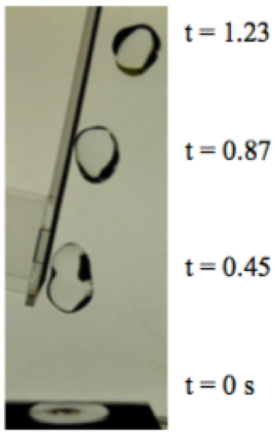
Logan Torres

Oblique Droplet Impacts on Super-hydrophobic Surfaces

In an effort to further apply the recent results of puddle jumping research, we seek to expand the oblique droplet impact studies of others by exploiting large liquid droplets in the near weightless environment of a drop tower. By using the spontaneous puddle jump mechanism, droplets of volumes 1 mL ≤ V ≤ 3 mL with corresponding Weber numbers of We ≈ 1 are impinged on surfaces inclined in the range 40° ≤ α ≤ 80° (measured from the horizontal plane). Impact surface wetting characteristics exhibit static contact angles θstatic = 165 ± 5°. All impacts result in complete rebound. At surface inclinations α > 70° and droplet volumes V ≥ 2 mL, impacts are accompanied with duel-contact 'walking' occurrences where droplet oscillations result in two recoils off the surface. Our experiments demonstrate the significance of droplet oscillation on impact dynamics by altering contact dimensions, contact time, and post-impact frequency from those of non-oscillating experiments.



A sequence of superimposed images shows oblique droplet impact phenomena with characteristic parameters: volume V = 3 mL, velocity U = 12.1 cm/s, corresponding Weber number We = 1.83, and surface inclination α = 80° (measured from the horizontal plane). Spontaneous ejection, impact, gliding, and rebound can be seen at t = 0, 0.45, 0.87, and 1.23 seconds, respectively.

Mentor: Dr. Mark Weislogel

Maseeh College of Engineering and Computer Science
PORTLAND STATE UNIVERSITY

SRC®
EducationAlliance
for Science, Engineering & Technology