Supplementary Materials for

"Symmetry-Breaking Drop Bouncing on Superhydrophobic Surfaces with Continuously Changing Curvatures"

WooSeok Choi and Sungchan Yun

Department of Mechanical Engineering, Korea National University of Transportation, Chungju 27469, Republic of Korea

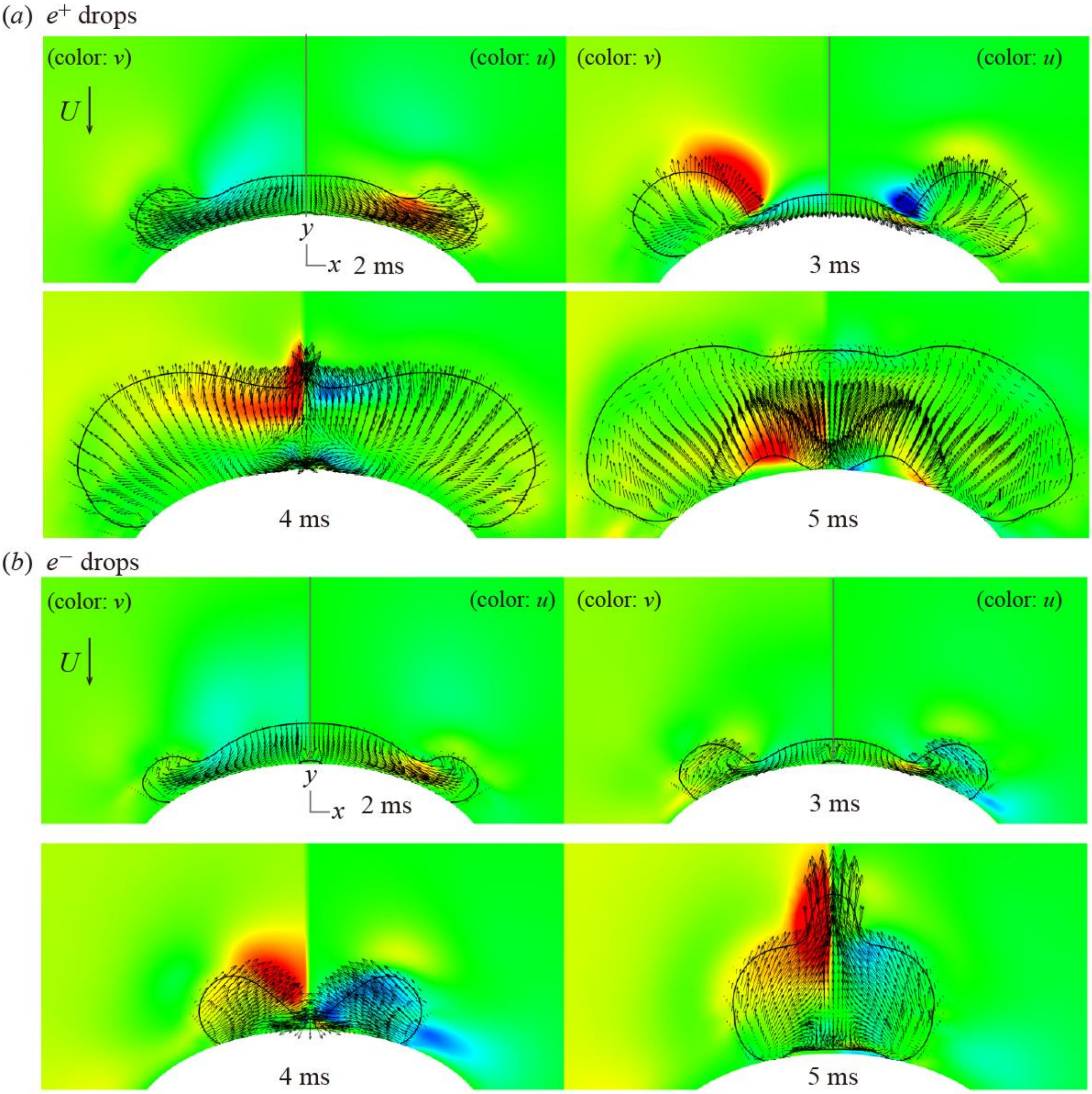

Figure S1. Velocity field distributions (arrow) and the magnitude of the velocity (color) of the drops with (a) e = +0.45 and (b) e = –0.45 on E(2.0, 1.2) surfaces at We = 24. U, u, and v correspond to the initial impact velocity, x-velocity, and y-velocity, respectively. The left and right columns of the contours represent the v and u, respectively. The intensity of the color is clipped at the initial impact velocity $\pm U$ (red: high; blue: low).

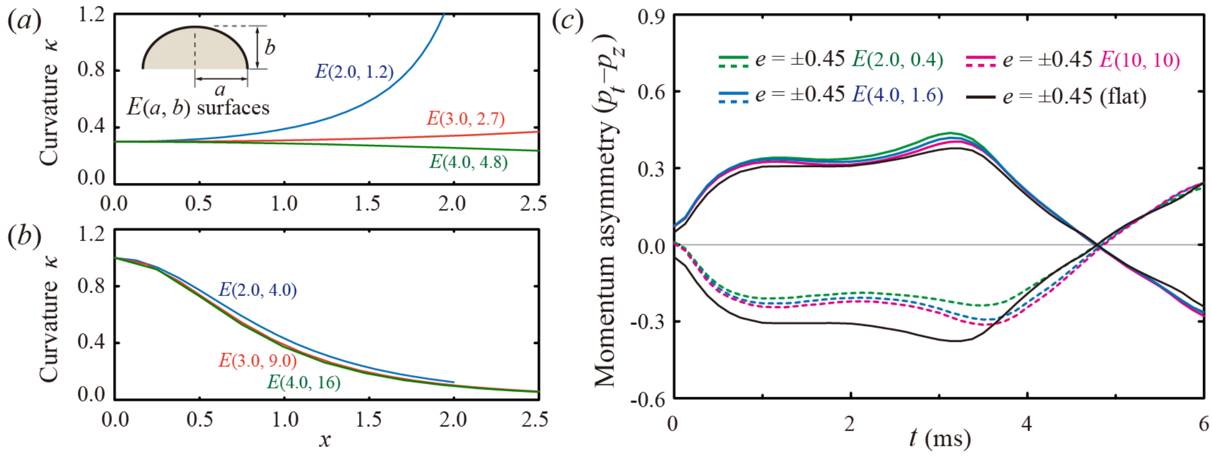

Figure S2. Dimensionless curvature κ along the x axis at the initial surface curvature of (a) $\kappa_0 = 0.3$ and (b) $\kappa_0 = 1.0$. The high deviation of κ between the surfaces at the low κ_0, whereas the slight deviation of κ between the surfaces at the high κ_0. (c) Temporal variations of the momentum asymmetry ($p_t - p_z$) at $e = +0.45$ (solid line) and $e = -0.45$ (dashed line) on the surfaces at $\kappa_0 = 0.1$. The momentum asymmetries on several E-surfaces, including the $E(10, 10)$ surfaces, are comparable to each other.

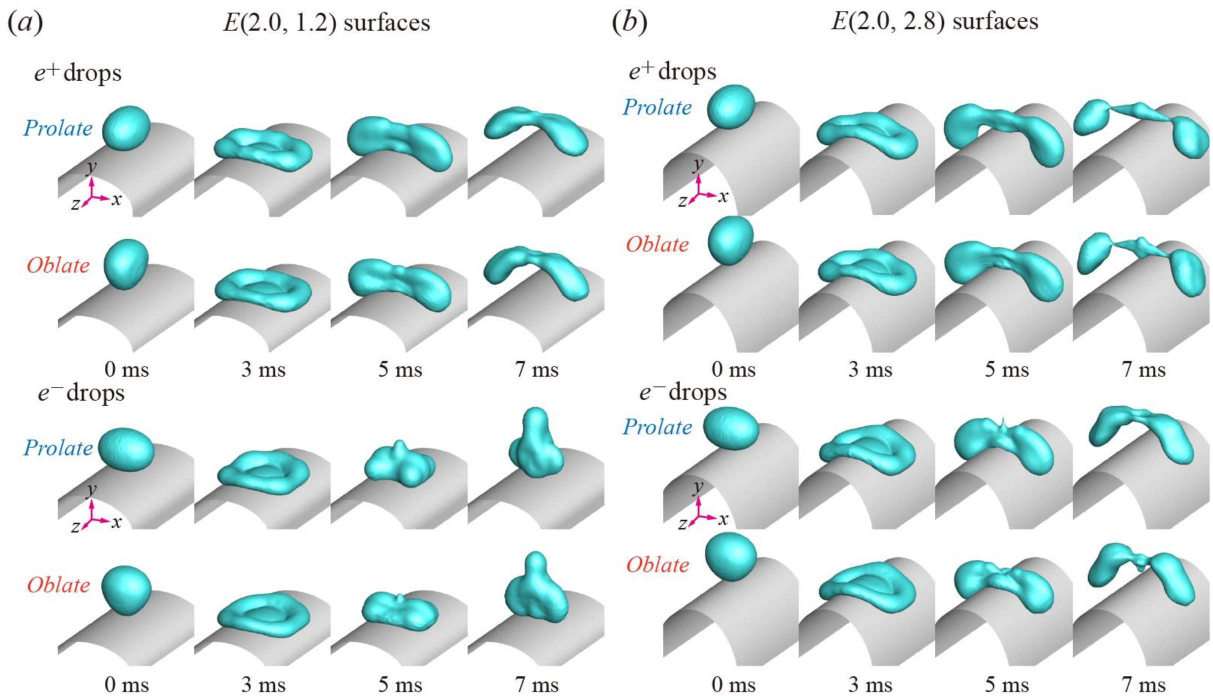

Figure S3. Bouncing dynamics on (a) $E(2.0, 1.2)$ and (b) $E(2.0, 2.8)$ surfaces for prolate and oblate spheroidal drops with $e = \pm 0.25$ at $We = 24$. The shape evolution and residence time of the prolate drops are comparable to those of the oblate drops.

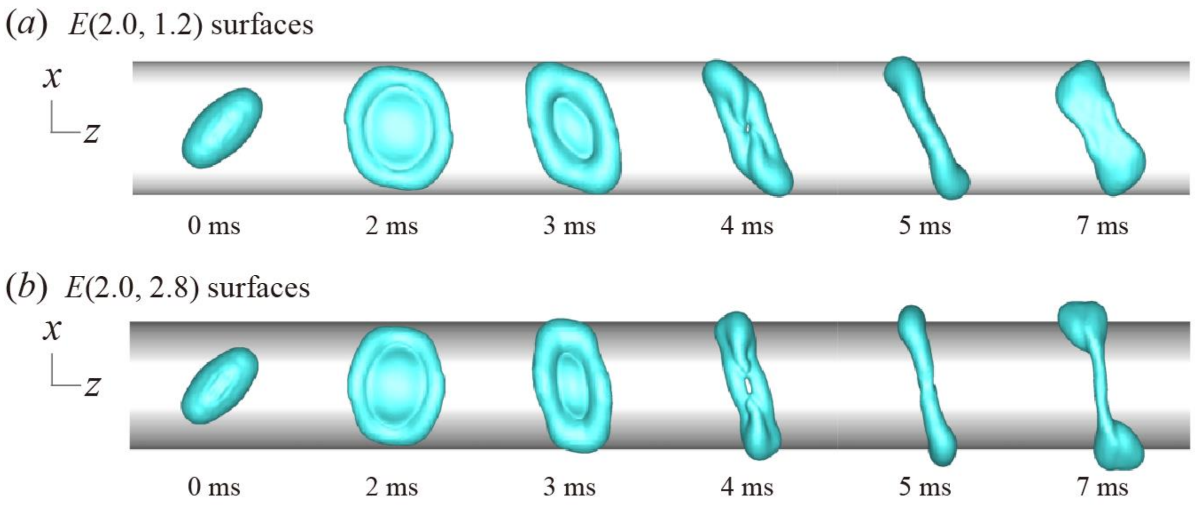

Figure S4. Snapshots of the bouncing dynamics of 45°-rotated prolate drops around the *y* axis on (a) *E*(2.0, 1.2) and (b) *E*(2.0, 2.8) surfaces at *We* = 24. The drops complete the liquid alignment along the direction biased slightly to the *x* axis because of a pronounced flow to the axis induced by the curvature, as shown at 5 ms. The drops leave the *b*1.2 and *b*2.8 surfaces at 5.3 and 5.2 ms, respectively.