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Rebound and Sticking Dynamics of Droplets Impinging on Wettable Surfaces ANUPAM MISHRA, YANBAO MA, Department of Mechanical Engineering, University of California, Merced, ARVIND GOPINATH, Department of Bioengineering, University of California, Merced — We investigate the rebound and sticking dynamics of liquid droplets impinging on wettable surfaces under zero gravity conditions using Multi-body Dissipative Particle Dynamics. A soft potential with an attractive and a repulsive component is used to model surface tension for liquid. The surface-droplet interactions are modeled by a similar potential with independently tunable attractive and repulsive components to obtain a wide range of wettability. The viscosity of the ambient medium is set to zero and the droplet density is held constant. Varying the attractive liquid-solid potential, the droplet velocity and size independently, we classify the impact dynamics into one of two categories - rebound or stick. Collapsing the results in two dimensionless parameters - the Weber number $\mathcal{W}]_{\mathrm{d}}$ based on drop properties, and an attraction parameter $\mathcal{A}_s$ based on the surface-drop potential - we obtain the critical curve separating the rebound from stick responses. Upon impact, both rebounding and sticking droplets form a pancake-shaped disk on the substrate. We calculate the evolution of the radius of the disk, track the center of mass distance from the substrate, calculate the rebound time and compare with analytical scalings in the literature.

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