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Viscous Puddle Jump TAIF AL JUBAREE, MARK WEISLOGEL , Portland State Univ, TAN HUA, Washington state university — The phenomena of spontaneous droplet jump from hydrophobic surfaces during low-g drop tower tests was recently reviewed (Wollman et al., Experiments in Fluids, 2016). Such drops may be over 10,000 times larger than typical terrestrial drops and are more akin to puddles than drops. In this work we investigate the effect of viscosity on the puddle jump process for drop/puddle volumes up to 100 mL and dynamic viscosities up to 950 cSt. The large low-cost hydrophobic surfaces are created using PTFE-coated 320 grit sand paper. We adopt a scaling approach to evaluate the relevant terms of the momentum equation before performing an energy balance for both driving and dissipation terms. A scaling law is corroborated by the experimental data for viscous puddle jump time and puddle recoil velocity. Numerical solutions are also conducted for comparisons. We demonstrate highly damped puddle jumps which may be exploited in turn to study further drop dynamics phenomena such as vanishingly small Weber number drop-wall impacts, over-damped oblique impacts and rebounds, and viscous wall-bound droplet boiling in low-gravity environments.

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