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Suppressing Viscous Drop Splashing with Surface Roughness ARIANA STRANDBURG-PESHKIN, Swarthmore College, MICHELLE DRISCOLL, SIDNEY NAGEL, James Franck Institute, University of Chicago — The splashing of a liquid drop on a smooth, dry surface depends on a host of factors: the speed, surface tension, viscosity and size of the drop, but also, surprisingly, the pressure and molecular weight of the surrounding gas.[1,2] In the case of a viscous drop splashing on a smooth surface, a thin sheet of fluid is first ejected from the rim of the expanding drop and then breaks up into droplets to form a splash.[3] When the surface is rough, different behavior, known as prompt splashing, may also be observed.[2,4] Here we explore the splashing of a viscous liquid as the surface roughness, R_a, is varied. We find that a small degree of roughness, $R_a < 1\ \mu m$, can completely suppress the thin-sheet ejection occurring on smooth surfaces. The degree of roughness necessary for this suppression decreases with increasing viscosity. In some cases, the roughness is great enough to suppress the thin sheet, but insufficient to produce a prompt splash, thus suppressing the splash entirely.

[1]L. Xu, W.W. Zhang, S.R. Nagel, PRL 94, 184505 (2005).
[2]L. Xu, PRE 75, 056316 (2007).
[3]M. Driscoll et al., BAPS DFD AG.00005 (2008).
[4]L. Xu, L. Barcos, and S.R. Nagel, PRE 76 066311 (2007).

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