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Yield stress fluid droplet impact on coated horizontal surfaces RANDY EWOLDT, BRENDAN BLACKWELL, MARC DEETJEN, Univ of Illinois - Urbana — Yield stress fluids, including gels and pastes, are effectively fluid at high stress and solid at low stress. Droplet impacts on a solid surface can create localized lumps and craters, or extended splash events featuring long lifetime ejection sheets. Here we experimentally study liquid-solid impact of yield stress fluids on pre-coated horizontal surfaces. Under critical splash conditions sheet breakup occurs, and ejected droplets can be nonspherical and threadlike due to the inability of capillary stresses to deform material above a certain lengthscale. The presence of a yield stress also allows complex contours forming on the surface to be stable at long times. Droplet size, impact velocity, surface coating thickness, and rheological material properties are varied. We identify regime maps of the stick/splash transition and quantify behavior with measures such as crater diameter, deposition thickness, impact event timescale, and radial extent of material deposition. The results are characterized as a function of appropriate dimensionless parameters in a manner that supports rheological fluid design for specific applications.

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