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Dense Suspension Splash[1] WENDY ZHANG, KEVIN M. DODGE, IVO R. PETERS, JAKE ELLOWITZ, MARTIN H. KLEIN SCHAARSBERG, HEINRICH M. JAEGER, University of Chicago — Upon impact onto a solid surface at several meters-per-second, a dense suspension plug splashes by ejecting liquid-coated particles. We study the mechanism for splash formation using experiments and a numerical model. In the model, the dense suspension is idealized as a collection of cohesionless, rigid grains with finite surface roughness. The grains also experience lubrication drag as they approach, collide inelastically and rebound away from each other. Simulations using this model reproduce the measured momentum distribution of ejected particles. They also provide direct evidence supporting the conclusion from earlier experiments that inelastic collisions, rather than viscous drag, dominate when the suspension contains macroscopic particles immersed in a low-viscosity solvent such as water. Finally, the simulations reveal two distinct routes for splash formation: a particle can be ejected by a single high momentum-change collision. More surprisingly, a succession of small momentum-change collisions can accumulate to eject a particle outwards.

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Wendy Zhang
University of Chicago

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