Abstract Submitted
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Dense suspension splash KEVIN M. DODGE, IVO R. PETERS, JAKE ELLOWITZ, MARTIN H. KLEIN SCHAARSBERG[1], HEINRICH M. JAEGER, WENDY W. ZHANG, Department of Physics and the James Franck Institute, University of Chicago, Chicago, IL 60637 — Impact of a dense suspension drop onto a solid surface at speeds of several meters-per-second splashes by ejecting individual liquid-coated particles. Suppression or reduction of this splash is important for thermal spray coating and additive manufacturing. Accomplishing this aim requires distinguishing whether the splash is generated by individual scattering events or by collective motion reminiscent of liquid flow. Since particle inertia dominates over surface tension and viscous drag in a strong splash, we model suspension splash using a discrete-particle simulation in which the densely packed macroscopic particles experience inelastic collisions but zero friction or cohesion. Numerical results based on this highly simplified model are qualitatively consistent with observations. They also show that approximately 70% of the splash is generated by collective motion. Here an initially downward-moving particle is ejected into the splash because it experiences a succession of low-momentum-change collisions whose effects do not cancel but instead accumulate. The remainder of the splash is generated by scattering events in which a small number of high-momentum-change collisions cause a particle to be ejected upwards.

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