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Splashing onset in dense suspension droplets IVO R. PETERS, MARTIN H. KLEIN SCHAARSBERG, QIN XU, HEINRICH M. JAEGER, University of Chicago — We investigate the splashing onset of droplets of dense suspensions upon the impact onto a solid substrate. Unlike in the splashing of pure liquid droplets, the ejecta of dense suspensions are individual solid particles. We show that a global hydrodynamic balance is unable to predict the splashing onset and propose to replace it by an energy balance at the level of the particles in the suspension. The key ingredient for this balance is to take into account collisions between the particles at the outer edge of the droplet. We experimentally verify that the resulting, particle-based Weber number gives a reliable, particle size and density dependent splash onset criterion. We further show that the same argument also explains why, in bimodal systems, smaller particles are more likely to escape than larger ones. Finally, we show that increasing the viscosity of the suspending liquid effectively decreases the efficiency of the collisions between particles and, consequently, increases the splash onset velocity.

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