Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Splash Suppression by Solvent Viscosity in Dense Suspension Impact WENDY ZHANG, KEVIN DODGE, IVO PETERS, MARTIN KLEIN SCHAARSBERG[1], HEINRICH JAEGER, University of Chicago — When a dense suspension droplet impacts a hard surface, it will either break apart ("splash") or remain in a compact configuration without ejecting any particles. We use experiments and discrete particle simulations in which relative particle motions are penalized by lubrication-flow drag to analyze the influence of solvent viscosity on splashing. We find that suspension splash is driven by particle inertia. It can be suppressed in 2 different ways. At low solvent viscosity, lubrication drag due to viscous flow has a negligible effect. Splash is suppressed by surface tension overcoming particle inertia. At high solvent viscosity, lubrication drag alone suppresses splashing. Because impact produces an expanding flow that stretches the suspension radially, suppression in the high-viscosity regime is largely accomplished by lubrication-flow drag preventing initially nearby particle pairs from separating fully. Energy dissipation by viscous flow during collisions plays a smaller role.

[1]Present Address: Physics of Fluids Group, University of Twente

Wendy Zhang
University of Chicago

Date submitted: 14 Nov 2014 Electronic form version 1.4