

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Forces and flows during high speed impacts on a non-Newtonian suspension MELODY LIM, JONATHAN BARES, ROBERT BEHRINGER, Duke University — A suspension made of starch particles dispersed in water displays significant non-Newtonian behavior for high enough particulate concentration. In order to shed light on the possible micro-structural basis of this behavior, we perform collisions on a quasi-2D suspension, using a high speed camera to gain access to the dynamics of the suspension. We suspend small dark particles (charcoal) in the cornstarch suspension. From these, we can carry out particle tracking to determine the velocity field during impact. We observe a shock-like propagation in the cornstarch suspension. Although the dynamics of this shockfront are strongly correlated to the dynamics of the intruder, we find that a simple process of momentum transfer to the suspension is insufficient to account for the force experienced by the impactor. We use boundaries made from a photoelastic material which then registers the arrival of strong forces at the boundaries. By linking the forces observed at the boundaries with the dynamics of the suspension, we assess the role of interactions with the boundaries of the suspension.

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Date submitted: 31 Jul 2014

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