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Quasi-2D dynamic jamming of cornstarch suspensions IVO PETERS, HEINRICH JAEGER, Univ of Chicago — A dense suspension of cornstarch in water has the extraordinary behavior that, when perturbed lightly, it behaves like a liquid, but, when impacted at high velocities, the material solidifies. Waitukaitis et al. (Nature, 2012) have shown that this behavior is due to a dynamic jamming front that propagates through the system. The details of this jamming front, however, are obscured by the surrounding suspension in a 3-dimensional system. In our current experiment, we prepare a layer (thickness order 1 cm) of the cornstarch suspension, which floats on a dense, low-viscosity liquid. This setup provides a stress-free boundary condition on the bottom and upper surface of the suspension. The floating suspension is bounded at three sides by solid walls, and on one side by a thin rubber sheet. We perturb the system by impacting an object horizontally on one side at a controlled velocity using a linear actuator. Tracer particles sitting on the top surface of the suspension allow us to perform PIV on the perturbed suspension. From the PIV analysis we determine the shape of the jammed region, the growth rate, shear rates, and the expected force response due to the added mass. We compare this to direct force measurements and determine which components make up the total force response.

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