

Abstract Submitted
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Particle-Laden Liquid Bridge: Simulation and Experiment¹

MARK D. SHATTUCK, ZHUSONG LI, JEFFERY F. MORRIS, The City College of New York, MARC MISKIN, HEINRICH JAEGER, University of Chicago — Particle-laden fluids like pastes are important in many industries, but they are not well understood. We developed coordinated experimental and computational techniques to explore the flow behavior of these systems. Due to surface tension fluids can be suspended between the flat ends of two cylinders in a “liquid bridge.” In experiments, we vary the gap height and measure the forces and bridge shape to determine the response of the particle-laden fluid. We simulate the liquid bridge using a new hybrid technique combining direct particle trajectory calculations with a grid based model for the surface of the fluid. The model is appropriate for flows that are slow compared to the speed of sound in the fluid and flows in which the fluid can move freely between the particles. By combining experiments and simulation we have unprecedented access to information on both particle details and overall fluid response to external stress.

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