PHYSICAL MATH SEMINAR

Fractured Flows: Suspensions Pushed Too Far

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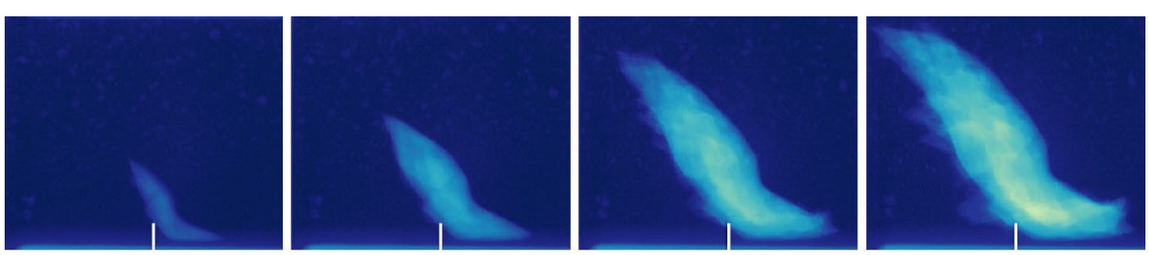
ABSTRACT:

Particle suspensions can fracture into intricate patterns as they are pushed out of equilibrium. We probe the fracture and relaxation characteristics of dense aqueous cornstarch suspensions that exhibit discontinuous shear-thickening behavior. Air injection into three-dimensional bulk suspensions can lead to smooth bubbles that rise upwards under the action of buoyancy or to sharp fractures that remain attached to the injection nozzle. We link the shape and the relaxation dynamics of the air cavity to the suspension rheology. We discuss how the bubbles exhibit distinct bursting patterns as they reach the air interface, and how the bursting characteristics might reveal information about the rheology of thin suspension films. In a second example, we report the crack dynamics and morphology occurring as drops of aqueous nanoparticle suspensions evaporate on a glass surface and leave behind a solid particle deposit. We show that in the final stage of drying, the stresses in the deposit can be released in two distinct ways: by bending out of plane or by forming a second generation of cracks.



TUESDAY, FEBRUARY 24, 2026

2:30 PM – 3:30 PM

Building 2, Room 449

MIT MATHEMATICS

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