Modelling persistent holes in complex fluids

ROBERT D. DEEGAN, RICHARD R. KERSWELL, University of Bristol — MeKr et al (PRL 184501 98, (2004)) discovered that vertically vibrated shear thickening fluids can support stable vertical interfaces. These stable structures take the form of holes, voids that span the fluid layer which can last indefinitely, or of fingers, columnar-type protrusions which persist for thousands of cycles. We show that the stability of the holes can be understood in terms of a hysteretic rheology model, and confirm the existence of this hysteresis in rheological measurements of a mixture of cornstarch and water.