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Pinch-off Dynamics of Non-Newtonian Fluids F.M. HUISMAN, S.R. GUTMAN, P. TABOREK, University of California-Irvine — The pinch-off dynamics of a variety of shear-thinning fluids (foams, concentrated emulsions, and slurries) were studied using high speed videography. The pinch was characterized by the variation of the minimum neck radius rmin as a function of the time to pinch t, with rmin prop to t^{α}. The rheology of shear thinning fluids can be characterized by an exponent $\tau = k\dot{\gamma}^n$, with n < 1. We found that for a variety of shear-thinning fluids including mayonnaise and acrylic paint, rmin scales with t to a power α equal to the flow index for the particular fluid. The flow index was measured using a TA instruments AR-G2 rheometer. The flow index for acrylic paint was 0.440 +/- 0.014 and rmin scales with t to the 0.41 +/- 0.03; for mayonnaise the flow index was 0.355 +/- 0.014; and rmin scales with t to the 0.35+/- 0.02. To study the transition from conventional Newtonian pinch, we systematically varied the concentration of a water-Xanthan gum mixture.

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