

Abstract Submitted  
for the DFD09 Meeting of  
The American Physical Society

**The mechanism for shear thickening in suspensions** ERIC BROWN, HEINRICH JAEGER, University of Chicago — Densely packed suspensions can shear thicken, in which the viscosity increases with shear rate. Video microscopy along with rheology measurements show the shear thickening regime is a transition from negligible particle motion at low stresses to fully developed shear flow at higher stresses. The onset of shear thickening occurs when the shear stress is sufficient to pull particles apart; for example against gravity for large particles, and can be tuned by inducing electric or magnetic dipoles. Dilation can be observed as particles penetrate the fluid surface in the high stress regime. The maximum stress of the shear thickening regime is shown to match, for a wide range of suspensions, the ratio of surface tension divided by a radius of curvature comparable to the particle size. This suggests the large stress associated with shear thickening comes from capillary forces as a consequence of dilation.

Eric Brown  
University of Chicago

Date submitted: 05 Aug 2009

Electronic form version 1.4