Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Squeeze Flow of Yield Stress Fluids[1] DAVID PELOT, ALEXANDER YARIN, University of Illinois at Chicago — The squeeze flow of yield stress materials are investigated using a non-invasive optical technique. In the experiments, cylindrically-shaped samples of Carbopol solutions and Bentonite dispersions are rapidly compressed between two transparent plates using a constant force and the instantaneous cross-sectional area is recorded as a function of time using a high speed CCD camera. Furthermore, visualization of the boundary reveals that the no-slip condition holds. In addition, shear experiments are conducted using parallel-plate and vane viscometers. The material exhibits first a fast stage of squeezing in which the normal stresses dominate and viscosity plays the main role. Then, the second (slow) stage sets in where the material exhibits a slow deformation dominated by yield stress. At the end, the deformation process is arrested by yield stress. The material response is attributed to the Bingham-like or Herschel-Bulkley-like rheological behavior. Squeeze flow is developed into a convenient and simple tool for studying yield stress materials.

[1]This work is supported by the United States Gypsum Corp.

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Date submitted: 15 Nov 2013 Electronic form version 1.4