

MAR07-2006-000572

Abstract for an Invited Paper
for the MAR07 Meeting of
the American Physical Society

Dynamics of the Shear Banding Instability¹

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A variety of complex fluids, such as liquid crystals, polymers, and surfactant solutions (lamellae or cylindrical micelles), are easily perturbed by shear flow and exhibit apparent “phase transitions” and complex nonlinear dynamics. “Shear banding,” or separation of material into bands of different apparent viscosities, has been reliably observed in wormlike micelles and many other systems. Despite a general one dimensional (1D) theory that predicts stable bands, recent experiments suggest that the generic situation is dynamic, rather than steady bands. After an overview I will discuss recent calculations that address the possibility of rheo-chaos, and two dimensional calculations to verify or refute the previously found 1D solutions. I will also discuss the possibility of shear banding in the closely related system of entangled polymer solutions.

¹Work done in collaboration with SM Fielding (Manchester University).