Abstract Submitted
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Visco-plastic Lubrication: New Areas for Application SARAH HORMOZI, IAN FRIGAARD, Department of Mechanical Engineering and Mathematics, University of British Columbia — Stable multi-layer flows can be achieved at high Reynolds numbers by using a yield stress fluids in a lubricating outer layer. These flows have been demonstrated to be linearly and nonlinearly stable as well as observable experimentally; see Frigaard (2001), Moyers-Gonzalez et al. (2004) and Huen et al. (2007). Recently, we have studied these flows computationally in the setting of a Newtonian core fluid surrounded by a Bingham lubricated fluid, within pipe and channel configurations; see Hormozi et al. (2011a) and Hormozi et al. (2011b). The results show that we are able to freeze in non-planar interface and form interesting patterns by retaining an unyielded plug region at the interface. Our studies open up new potential areas for application such as drop encapsulation and near net shape production of multi-layered products with axial variations. We give an overview of experimental results on establishing these exotic patterns.
References: I.A. Frigaard, J. Non-Newt. Fluid Mech., 100, (2001) 4976. M. Moyers-Gonzalez, I.A. Frigaard & C. Nouar, J. Fluid Mech., 506, (2004) 117146. C.K. Huen, I.A. Frigaard & D.M. Martinez, J. Non-Newt. Fluid Mech., 142, (2007) 150161. S. Hormozi, K. Wielage-Burchard & I.A. Frigaard, J. Fluid Mech.,673, (2011) 432 467. S. Hormozi, K. Wielage-Burchard & I.A. Frigaard, J. Non-Newt. Fluid Mech.,166, (2011) 262278.

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