

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Viscoelastic instabilities in a 3D Stokes-Oldroyd-B fluid BECCA THOMASES, UC Davis, MICHAEL SHELLEY, Courant Institute — The consequences of three-dimensional viscoelastic instabilities are examined numerically using the Oldroyd-B model in the low Reynolds number (Stokes) regime. The fluid is driven by a simple time-independent forcing that, in the absence of viscoelastic stresses, creates a four-roll mill in (x,y) which is constant in z . It is now known that such forcing will force the 2d version of this system into symmetry breaking and flow mixing. Here we find that at sufficiently large, but $O(1)$, Weissenberg number, 3d perturbations grow exponentially and lead to complex three-dimensional flow dynamics which can differ markedly from the 2d case.

Becca Thomases
UC Davis

Date submitted: 05 Aug 2011

Electronic form version 1.4