Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Linear stability analysis of pipe Poiseuille flow for an Oldroyd-B fluid ARMANDOJANNI PETRUCCI OREFICE, GENNARO COPPOLA, LUIGI DE LUCA, Università degli Studi di Napoli "Federico II" — The effects of viscoelasticity on the linear evolution of disturbances on pipe Poiseuille flow are numerically investigated. The viscoelastic fluid is described by the Oldroyd-B model and the work primarily focuses on high Reynolds numbers flows of diluted solutions. The equations governing both flow and elastic variables are written in polar coordinates and are discretized by an accurate Chebyshev pseudospectral code. Both linear modal and non modal stability properties of infinitesimal disturbances are considered. The eigenvalue spectrum of the governing operator and linear transient growth of three dimensional perturbations are determined and the results are compared to analogous classical results for pipe Poiseuille flow. Non modal analysis reveals that elasticity is generally active in reducing the transient growth at high values of streamwise wave number.

Armandojanni Petrucci Orefice
Università degli Studi di Napoli "Federico II"

Date submitted: 31 Jul 2013 Electronic form version 1.4