Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Stability Analysis of Non-Newtonian Rotational Flow with Hydromagnetic Effect NARIMAN ASHRAFI, None — Stability of the magnetorheological rotational flow in the presence of a magnetic excitation in the tangential direction is examined. The conservation of mass and momentum equations for an isothermal Carreau fluid between coaxial cylinders are numerically solved while mixed boundary conditions are assumed. In the absence of magnetic excitation, the base flow loses its radial flow stability to the vortex structure at a critical Taylor number. The emergence of the vortices corresponds to the onset of a supercritical bifurcation. The Taylor vortices, in turn, lose their stability as the Taylor number reaches a second critical number corresponding to the onset of a Hopf bifurcation. The tangential magnetic field turns out to be a controlling parameter as it alters the critical points throughout the bifurcation diagram. Also, the effect of the Hartmann number, the Deborah number and the fluid elasticity on the flow parameters were investigated.

Nariman Ashrafi
None

Date submitted: 06 Aug 2014 Electronic form version 1.4