Stability of viscoelastic flows

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We consider a model of a viscoelastic fluid in which the classical Oldroyd-B model is extended to account for shear-dependent viscosity. The formulation was proposed in [1] to model the flow of blood. Suitable forms of the energy are derived and sufficient conditions for stability obtained. These conditions depend on relationships between a nondimensional parameter, the Weissenberg number, and the maximum rate of change of the viscosity. The conditions are illustrated by considering a simple model problem.

References

[1] K. K. Yeleswarapu, *Evaluation of continuum models for characterizing the constitutive behavior of blood,* PhD thesis, University of Pittsburgh, Pittsburgh, PA, 1996.