

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Effect of the Convected Terms in the Transient Viscoelastic Flow

NARIMAN ASHRAFI, MEYSAM MOHAMADALI, Young Researchers and Elites Club, Science and Research Branch, Islamic Azad University, Tehran, Iran — The influence of fluid elasticity is examined for the plane Couette flow (PCF) of a Johnson Segalman (J.S) fluid. The model takes into account the interrelations of velocity gradients and stress components through introduction of appropriate coefficients in the elastic terms of constitutive equation. The flow field is obtained from the conservation and constitutive equations using the Galerkin projection method. Both inertia and normal stress effects are included. Effect of several values of governing parameters such as introduced coefficients, Reynolds number and Weissenberg number on velocity and normal and shear stresses profiles are explored in detail. The results show that the oscillating behavior of velocity profile tends to grow as the coefficients increase. The shear stress behavior is dependent on the coefficients of the convected terms and the flow properties. For higher Reynolds the shear stress reaches a maximum and then decreases to minimum. From a numerical point of view, the model also allows for the velocity and stress components to be represented by truncated series.

Nariman Ashrafi
Young Researchers and Elites Club, Science and Research Branch,
Islamic Azad University, Tehran, Iran

Date submitted: 24 Jul 2015

Electronic form version 1.4