

In the present work we derive two nonlinear models for incompressible rate type fluids that describe the behaviour of the viscoelastic fluids. Making the linearization of the elastic response, we obtain two models similar to the popular models for viscoelastic fluid - Oldroyd-B and Burgers model. Furthermore, we modify the nonlinear model by assuming that one of the coefficient depends on the first invariant of the deformation gradient. We present an experiment that documents the stress relaxation of asphalt in the cylindrical geometry. We study the flow at two different geometries - the parallel plate flow and the axially symmetric cylinder flow. If it is possible, the problems are solved analytically, otherwise they are solved numerically. We investigate what model is capable of fitting the experimental data.