Numerical study on the performance of the Leonov model

유재현, 안경현*
서울대학교
(ahnnet@snu.ac.kr*)

Polymeric liquids are frequently used in processes. Polymeric liquids exhibit both characteristics of viscous liquid and elastic solid when undergoing deformation, which is called as viscoelasticity. The flow of polymeric liquids is much different from the flow of Newtonian fluids. To predict the flow of polymeric liquids, the constitutive equations need to be used. Constitutive equations are mathematical relationships that allow one to calculate the stresses in a liquid, given the flow history. With a reliable constitutive equation, one can predict the flow occurring in processes. Constitutive equation is a set of assumptions and idealizations about the molecular or structural forces and motions that produce stress. The validity of the constitutive equation depends on how accurately constitutive equation predicts experimental data. The Leonov model is one of the constitutive equations derived by nonequilibrium thermodynamics. In this study, the material functions of the Leonov model were calculated numerically; they include shear viscosity, extensional viscosity and so on. In addition, the calculated material functions were compared to experimental data to prove the validity of the model.