



G09.38

Simulation of Elongational Flow in a Cylindrical Converging Extrusion Tube Die

*A. A. Yousefi (a,b), A. Daramizadeh (b)

(a) *Research center of Bandar Imam Petrochemical Company, Mahshahr, Iran*(b) *Department of Plastics Materials, Faculty of Polymer Processing, Iran Polymer & Petrochemical Institute, P.O. Box 14965/159, Tehran, Iran*

Knowledge of the elongational flow and its influence on the extrusion process is becoming more and more important in polymer processing. Processing of a polymer via extrusion as in film casting, film blowing, fiber spinning or thermoforming is affected by shearing and elongational flow of the material simultaneously. Many research works have been devoted to simulation of flow in two dimensions. In this study, a three-dimensional numerical model capable of simulating elongational polymer flow in a cylindrical die for extrusion of thin piezoelectric tubes has been developed. This technique represents an effective tool, which can be used to study the flow field, velocity distribution, stream lines and other flow characteristics of polymer melts. The code that has been used to simulate the steady-state of flow was FluentTM. The geometry includes an abrupt contraction that lead to an annular narrow channel. We used power-law model to simulate the viscosity of the PVDF melt. Numerical results show that there is a very good distribution of lambda parameter (the elongational flow index) at the exit of the die.

Keywords: Simulation, Extrusion, Converging-Diverging cylindrical Die, Elongational Flow, tube, Piezoelectricity