Abstract Submitted for the DFD13 Meeting of The American Physical Society

Parameter effects on shear stress of Johnson–Segalman fluid in **Poiseuille flows** XIANG QIU, School of Science, Shanghai Institute of Technology, Shanghai 201418, JIANPING LUO, School of Mechanical Engineering, Shanghai Institute of Technology, Shanghai 201418, YULU LIU, Shanghai Institute of Applied Mathematics and Mechanics, Shanghai University, Shanghai 200072 — Exact solutions of shear stress versus velocity gradient and the numerical solutions of streamwise velocity distribution in radial direction of a JohnsonSegalman fluid in a circular pipe are obtained. The effects of material parameters, Weissenberg number, ratio of viscosities and slip parameter, on shear stress and streamwise velocity have been considered to investigate the discontinuous velocity derivatives and stick-slip phenomenon at the wall. We find that there is a non-monotonic relationship between the shear stress and rate of shear for certain values of the material parameters and consequently, the velocity profile has discontinuous derivatives. Moreover, the variational range of material parameters is given for the appearance of a non-monotonic relationship between the shear stress and the rate of shear. Finally, we have shown the exact expression of critical pressure gradient and also have given the conditions where spurt phenomena occur.

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Date submitted: 01 Jul 2013

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