Meeting: 1005, Newark, Delaware, SS 7A, Special Session on Frontiers on Complex Fluid Flows: Analytic and Computational Methods

1005-76-85 **Louis F Rossi*** (rossi@math.udel.edu), Department of Mathematical Sciences, Newark, DE 19716, and **L Pamela Cook** (cook@math.udel.edu), Department of Mathematical Sciences, Newark, DE 19716. *Dilute worm-like micellar solutions: Model and numerics in Taylor-Couette flow.*

Through a microstructural bead-spring description a coupled stress/density model for the flow of dilute micellar solutions is presented. The model derivation systematically includes finite extent of the bead-spring, bead slippage, and finite extensibility of the springs. The slippage is a non-affine motion related to micellar break-up. The model reduces to the the Johnson-Segalman model with a non-monotone flow curve in the limit of no migration effects. Numerical calculations of the model in cylindrical Taylor-Couette flow are presented. The linear stability analysis of solutions along the flow curve demonstrates that inclusion of the higher-order stress terms in the model provides a selection mechanism in multi-valued regions of the underlying flow curve. The stress-strain curve exhibits a plateau as observed in experiments. Shear banding is predicted both in velocity gradients and in the alignment/ orientation of the bead-springs. Computed solutions are compared with laboratory experiments. (Received January 31, 2005)