Computer simulation study on the shear-induced phase separation in semi-dilute polymer solutions by using Ianniruberto-Marrucci model SHOTARO NISHITSUJI, MIKIHITO TAKENAKA, Graduate School of Engineering, Kyoto University, TAKASHI TANIGUCHI, Graduate School of Science and Engineering, Yamagata University, HIROKAZU HASEGAWA, Graduate School of Engineering, Kyoto University — When shear flow is imposed to a semidilute polymer solution at its one phase region, the solution exhibits strong turbidity. This phenomenon is called shear-induced concentration fluctuation and/or phase separation. Theoretically, Doi and Onuki submitted a two fluid model which incorporates the gradient term of the stress tensor into Ginzburg-Landau type free energy functional, and account for the spatial heterogeneity of the stress field by dynamic asymmetry. We developed the new computer simulation scheme with Doi-Onuki theory, where the Ianniruberto-Marrucci model (IM model) is employed as the constitutive equation, to simulate the dynamics of the shear-induced concentration fluctuation and/or phase separation in semi-dilute polymer solutions. In the simulation results, the concentration fluctuations appear and coarsen with time under shear flow and the change in shear stress with time exhibits the overshoot behavior due to the relaxation of entanglement. These results agree with the experimental results.

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