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Assumptions in Entanglement models and Their Effect on Non-Linear Rheology Predictions MARAT ANDREEV, RUDI STEENBAKKERS, JAY SCHIEBER, Illinois institute of Technology — While tube and slip-link theories are able to describe shear flow stresses qualitatively, and in some cases quantitatively, elongational flow prediction remains elusive. Both the GLaMM tube theory and primitive chain network simulations overpredict the magnitude of stress. As a result, several groups have suggested making the friction chain-conformation dependent, giving an enhancement to stress relaxation in elongational deformations when chains are highly oriented. Here we take a different tack, and examine the effect of typical assumptions and approximations made in these theories by use of the discrete slip-link model. Since the model exists on a relatively detailed level of description, it allows examination of assumptions without resorting to crude approximations. We find that while some of these approximations indeed fail in elongational flows at high strains, the theory is still unable to predict data. What's more, unlike other predictions, this model underpredicts the stress, and would therefore not be in agreement with the assumption of conformation-dependent friction as currently hypothesized.

Marat Andreev
Illinois institute of Technology

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