Scaling Laws for Polymers in Dissipative Particle Dynamics Revised

Posel, Z.
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[1]Z. Posel, [1,2]M. Lísal
[1] Department of Physics, Faculty of Science, J. E. Purkinje University, Ústí nad Labem, Czech Republic; [2] E. Hála Laboratory of Thermodynamics, Institute of Chemical Process Fundamentals of the ASCR, v. v. i., Prague, Czech Republic

We present here a systematic study of dynamic behavior for polymer (PE) melt by means of Dissipative Particle Dynamics (DPD). We used DPD spring potential between adjacent segments. By changing various parameters related to spring potential like stiffness k, equilibrium distance r_0 and parameters related to dynamic behavior like friction coefficient γ presented in dissipation force we tested their influence on scaling laws. We also compared these scaling laws obtained from our simulations with predictions from Rouse theory.
We also used FENE spring potential that introduces maximum bond length and increases stiffness of a spring between adjacent segments for large extensions. Therefore it is used for more realistic description of polymer melt.
We compared behavior of these two potentials mainly by comparing segment distance distributions (SDD). We made few generalizations for these two types of potentials based on comparing of SDD and related stiffness, maximum bond length and equilibrium distance. For generalization in dynamic behavior we compared diffusion coefficient, friction coefficient and viscosity.