Abstract Submitted
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**Importance of the difference between maximum and average tube length fluctuations of entangled polymers**[1] DAVID SHIRVANYANTS, University of North Carolina at Chapel Hill, SERGEY PANYUKOV, Lebedev Physics Institute, Russian Academy of Sciences, MICHAEL RUBINSTEIN, University of North Carolina at Chapel Hill — Classical analysis of tube length fluctuations (TLF) in entangled polymer solutions and melts includes only mean fluctuations and strongly underestimates the effect of TLF. We show that maximum fluctuations lead to additional logarithmic time dependence of stress relaxation function $\mu(t)$ that varies with time $t$ at $t < \tau_R$ as $\mu(t) \sim t^{1/4} \log t$ instead of $\mu(t) \sim t^{1/4}$, where $\tau_R$ is Rouse time. At $\tau_R < t \ll \tau_d$, where $\tau_d$ is reptation time, we observe $\mu(t) \sim (\log t)^{1/2}$, instead of time independent $\mu(t)$ of classical theory. Due to these logarithmic corrections stress relaxation is not a function of $N/N_e$ alone, but also depends on $N_e$, where $N$ is the number of Kuhn monomers, and $N_e$ the entanglement strand length. Improved analysis of TLF leads to a better description of stress relaxation and a more accurate estimate of $N_e$ from the measured $\mu(t)$.

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