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Flow-deformed conformations of entangled polymers as persistent random walks YITZHAK SHNIDMAN, College of Staten Island, City University of New York — Modeling interfacial phenomena in polymer fluids requires resolution of chain conformations on the Kuhn length scale. If the chains are at thermodynamic equilibrium, or undergo flow deformation in the unentangled regime, this is accomplished by representing chain conformations as Wiener (uncorrelated) random walks. When *entangled* chains are deformed by flow, stretching and orientation of chain *strands* between successive entanglements entails *inertial*, as well as diffusive, aspects in the anisotropic propagation model for strand conformation. This is best captured by a *persistent* (correlated) random walk at constant speed, which is a second-order Markov process governed by the initial probabilities and the scattering rates for the velocities. We present here a generalized Green-Kubo relation linking these parameters to the second moment of the strand's end-to-end distance. The latter evolves according to an approximate differential equation coupling local flow deformation rate with strand stretching and orientation, which relax on distinct time scales [G. Marrucci and G. Ianniruberto, *Phil. Trans. R. Soc. Lond. A* **361**, 677 (2003)]. The proposed relation provides a cornerstone for a new *entangled* version of our dynamic self-consistent field theory, that thus far has been limited to unentangled inhomogeneous polymer fluids [M. Mihajlovic, T. S. Lo, and Y. Shnidman, *Phys. Rev. E* **72**, 041801 (2005)].

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