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Conformation and Dynamics of Linear Chains, Circular and Partial Loops JEN-FANG CHANG, Institute of Physics, Academia Sinica, YENGLONG CHEN, Institute of Physics & Research Center for Applied Science, Academia Sinica, POLYMER PHYSICS & COMPLEX FLUIDS TEAM — Recent single molecule experiments have reported the diffusivity ratio between circular and linear DNA of the same molecular weight to be 1.3, between the ratio predict by renormalization group theory (1.45) and classical Kirkwood theory (1.18). In earlier light and neutron scattering measurements of synthetic polymers, the ratio has been reported to be around 1.1-1.2. Our work employs the Lattice-Boltzmann method with Brownian dynamics to examine the diffusivity ratio for a long chain ($N=320$). We also examined partially closed loops that are half-closed, quarter-closed, and eighth-closed with the same contour length. Surprisingly, we find that the loop with the smallest radiuses of gyration and the highest diffusivity is not the fully closed (circular) loop, but a partially-closed one.

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