

Scaling aspects in the probability of random knots and links and the dynamics of ring polymers in solution

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Abstract:

We present two recent results: the excluded volume effect on the probability of random linking [1] and universality in the dynamics of knotted ring polymers in solution [2,3], after we briefly review some fundamental statistical and dynamical properties of random knots and links from the scaling viewpoint of critical phenomena. Before presenting the new results, we briefly review the scaling behavior of the probability of random knotting as a function of the number of monomers, N , and then discuss the topological swelling of a ring polymer with fixed topology in a good solvent but close to the theta temperature.

Here we remark that the scaling viewpoint may give only a rough approximation which are not exact. However, focusing scaling aspects, we can not only simplify the topological phenomena and but also describe their essential properties which are otherwise very hard to understand.

[1] N. Hirayama, K. Tsurusaki and T. Deguchi, Linking probabilities of off-lattice self-avoiding random polygons, in preparation.

[2] N. Kanaeda and T. Deguchi, Universality in the diffusion of knots, arXiv:0807.0304 (cond-mat.soft)

[3] N. Kanaeda and T. Deguchi, in preparation.