

How does a polymer stretch?

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Based on classical statistical mechanics, we calculate the exact partition function of the length extension of a discrete extensible wormlike polymer under a stretching force. The bonds extensibility is modeled with harmonic springs, and the links present the transversal bending recoil typical of the wormlike chain (WLC) model.

The evaluation has followed two methods: From the one hand by using the Transfer Matrix procedure to calculate numerically the extension/force curve of the polymer, whose outcomes have been double checked with numerical experiments given by Langevin simulations. On the other hand, by calculating some approximated analytical extension/force functions, the most accurate at the date, that can reproduce with high precision the numerical curves also at low values of the longitudinal elastic constant where the common phenomenological proposals differ considerably

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