

Assessing the polymer coil-globule state from the very first spectral modes

The determination of the coil-globule transition of a polymer is generally based on the reconstruction of scaling laws, implying the need for samples from a rather wide range of different polymer lengths N . The spectral point of view developed in this work allows for a very parsimonious description of all the aspects of the finite-size coil-globule transition on the basis of the first two Rouse (cosine) modes only, shedding new light on polymer theory. Capturing the relevant configuration path features, the proposed approach enables to determine the state of a polymer without the need of any information about the polymer length or interaction strength. Importantly, we propose an experimental implementation of our analysis that can be easily performed with modern fluorescent imaging techniques, and would allow differentiation of coil or globule conformations by simply recording the positions of three discernible loci on the polymer.

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