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ΘΕΜΑ: **Conformational, stress and birefringence relaxation of an initially straight biopolymer molecule**

ΤΟΠΟΣ: Αίθουσα Σεμιναρίων ΕΙΧΗΜΥΘ-ΙΤΕ

ΗΜΕΡΟΜΗΝΙΑ: Πέμπτη, 29 Απριλίου 2004

ΩΡΑ: 17:00

ΠΕΡΙΛΗΨΗ

This talk focuses on the relaxation of a flexible or stiff polymer chain from an initial straight configuration in a viscous solvent. Physically this problem may correspond to the case of a polymer chain stretched by a strong flow and then relaxed by switching the flow off. As it is well known, large stresses are developed even in dilute polymer Solutions involving fully stretched polymer chains. This problem is also motivated by recent experiments with single biomolecules relaxing after being fully extended by applied forces as well as by the recent development of nanodevices involving stretched tethered biopolymers. Our results are applicable to a broad range of synthetic polymers as well as biopolymers such as DNA, actin filaments, microtubules and rod-like viruses.

To study this problem, Brownian Dynamics simulations based on a discretized version of the wormlike model are employed. The relaxation of the full stress tensor is presented over a broad range of time scales, polymer lengths and chain stiffness. For the first time the configuration relaxation is presented over the same extended time periods as the stress relaxation; this is achieved by employing proper conformational functions and applying the scaling law methodology. Based on this coupling, the polymer relaxation is shown to be anisotropic at intermediate times and to have two intermediate-time behaviors; the explanation for these findings is provided. The early intermediate-time behavior is shown to constitute a truly universal behavior for any polymer from the flexible up to the ultra-stiff limit, i.e. from DNA to TMV. Additional results on the relaxation of the birefringence and the index of refraction tensor will be presented. Our numerical results compare well with experimental findings from initially straight DNA molecules.