Title:	Study of Unzipping Transitions of an Adsorbed Polymer and Block Copolymer DNA By a Periodic Force
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Abstract:	Abstract This thesis aims to study the the dynamic transitions in unzipping of an ad- sorbed polymer from a surface (or wall), a homopolymer double stranded DNA (ds- DNA), and the block copolymer dsDNA subjected to an external periodic pulling force. The unzipping transition, in the presence of a static pulling force, is well studied and is a first-order phase transition. The polymer unzips from the surface, and the DNA unzips to two single strands, only when the pulling force exceeds a critical value which depends on temperature. For the static force case the results do not depend on the DNA sequence. In the presence of a periodic force, it is found that the DNA, or the adsorbed polymer, can be unzipped from a zipped state to an unzipped state dynamically, either by varying the frequency of the periodic force keeping the amplitude fixed, or by varying the amplitude of the force at a constant frequency. The force-distance isotherms obtained from the time series of extension between the end monomers of the DNA (or the distance between the surface and the end monomer of the polymer) show hysteresis whose area acts as a dynamical order parameter. It is found that, at fixed force amplitude, the area of the hys- teresis loop first increases, reaches to a maximum at some frequency that depends on the force amplitude, and then decreases as the frequency of the periodic force is increased. The area of the loop is found to scale differently at higher and the lower frequencies. The thesis studies how the dynamical order parameter behaves for various types of surfaces and various sequences for the block copolymer DNA. The thesis also studies the Stochastic Resonance phenomena in the unzipping of a homopolymer and block copolymer DNA by a periodic force. ix
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