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(G*) Field-Driven Polymer Collisions in Nanotubes

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Even though dilute (unentangled) polymer solutions cannot act as gel-like sieving media, it has been shown that they can be used to separate DNA molecules in capillary electrophoresis. The separation then comes from sporadic and independent polyelectrolyte-polymer collisions. Here we explore such collisions in nanochannels (i.e., channels that are smaller than the normal size of the polymers), a situation where a charged analyte is forced to migrate “through” isolated uncharged molecules during electrophoresis. We use Langevin dynamics (LD) simulations to investigate the nature of these collisions and their effect on the net movement of both polymer chains. We identify several types of collisions, including some that are unique to nanochannels. These results suggest a few potential applications for the analysis of biomolecules.

Keyword-1

nanofluidics

Keyword-2

electrophoresis

Keyword-3

Biopolymers

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