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Dynamics of polymer translocation through a nanopore under an applied external field¹

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Polymer translocation is of considerable importance to many biological processes and is envisaged to be useful for rapid DNA sequencing. Using analytical techniques and Langevin dynamics simulations, we have investigated the following problems. (1) For polymer translocation into a long narrow channel driven by longitudinal flow,² we find that the translocation time shows a linear scaling behavior with the chain length. (2) For polymer translocation through nanochannels with different lengths,³ we observe a minimum of translocation time as a function of the channel length. (3) We have examined polymer translocation into confined systems, such as a slit,⁴ a fluidic channel,⁵ nanocontainers with different shapes,⁶ which shows different translocation dynamics compared with the translocation into an unconfined environment.

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