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The non-driven polymer translocation through a nanopore: relaxation and translocation are not decoupled GARY W. SLATER, MICHEL G. GAUTHIER, University of Ottawa — Most theoretical models describing the translocation of a polymer chain through a nanopore use the hypothesis that the polymer remains in an equilibrium random coil conformation during the process. In other words, models generally assume that the characteristic relaxation time of the chain is small enough compared to the translocation time that non-equilibrium polymer conformations can be ignored. We present Molecular Dynamics simulations that directly test this hypothesis by looking at the escape time of unbiased polymer chains starting with different initial conditions. We find that the chains are deformed for the systems studied, even though the translocation time is about 10 times larger than the relaxation time. Our most striking result is the observation that the last half of the chain escapes in less than 12% of the total escape time, which implies that there is a large entropy-driven acceleration of the chain at the end of its escape from the channel.

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