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Polymer translocation from a confining tube: the effect of a finite tube length DAVID SEAN, GARY W SLATER, Univ of Ottawa — Coarsed-grained Langevin Dynamics simulations of driven polymer translocation are used to study situations where the polymer is initialized inside a confining cylindrical cavity. The latter limits the number of conformations at the onset of translocation, which (in the highly driven limit) should lead to a net reduction in the variance of the mean translocation time. We vary both the confinement volume and the cavity aspect ratio to minimize the coefficient of variation of the translocation time. We also use a tension-propagation model and find that its predictions are in good agreement with our simulation results: both yield a minimum in the coefficient of variation for a tube having an aspect ratio corresponding to a diameter which is roughly twice the tube length. Moreover, fluctuations in the translocation coordinate $s(t)$ do not generally follow a power law with time $\langle \Delta s^2 \rangle \sim t^{\beta}$; for some of the geometries we actually observed non-monotonic fluctuations. We attribute this result to conformations containing hairpins, which are an outcome of having a polymer initially confined in a tube with a finite volume.

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