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Using an effective dimensionality to map the force-extension relation for a semi-flexible polymer in a nanoslit HENDRICK DE HAAN, University of Ontario Institute of Technology — The force-extension relation for a semi-flexible polymer is well described by the Marko-Siggia equation in both two and three dimensions. However, while of interest for experimental systems such as DNA in nanopits, the behaviour between these limiting dimensionalities is less understood. I will present results from simulations of a polymer subject to a stretching force F confined in nanoslits of varying heights h. Going from the 3D case to the 2D case, both the coefficients of the equation and the relevant persistence length are shown to change. This observation leads to the definition of an effective dimensionality, d_{eff}, to characterize the system. At low F, using d_{eff} in a generalized form of the Marko-Siggia relation provides good agreement with the simulation curves. However, at high F, d_{eff} drifts back towards $d = 3.0$. The reason behind this F dependence is discussed. Semi-empirical forms for strong and weak confinement regimes will be presented and shown to give good agreement across all slit heights and stretching forces. d_{eff} is thus dependent on h and F and provides a cohesive physical picture for all regimes.

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