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DNA dynamics squeezed inside a nano-channel with a sliding gasket TYLER CAMPBELL, ANIKET BHATTACHARYA, University of Central Florida, WALTER REISNER, McGill University, Canada — We study transients and steady states of a DNA inside a rectangular nano-channel squeezed by a sliding gasket[1,2,3]. We carry out Brownian dynamics (BD) simulation for a DNA modeled as a semi-flexible polymer characterized by its contour length L and the persistence length ℓ_p. Specifically we study the evolution of one dimensional concentration profile $c(x,t)$ and the chain extension R along the channel axis (x-axis) during both the contracting as well as the retracting phases as a function of the velocity of the nano-dozer, both in steady states and in transients as a function of the dimensionless parameter ℓ_p/D, where D is the channel diameter. Consistent with the equilibrium conformations in the form of de Gennes blobs ($\ell_p/D \sim 1$) and Odijk deflection lengths ($\ell_p/D \gg 1$), our systematic studies of the non-equilibrium dynamics of the squeezed DNA reveal interesting features which could be rationalized with their corresponding equilibrium conformations.

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