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Thermophoretic stretch of a polymer confined to a nanofluidic channel MARTIN BERTRAND, BELA JOOS, University of Ottawa — The precise manipulation of macromolecules by thermophoresis is quite promising. Indeed, Thamdrup *et al.* (Nano Lett., 10, 2010) successfully moved double-stranded DNA (dsDNA) filaments in microfluidic geometries and subsequently inserted them into nanochannels using thermophoretic forces originating from highly localized thermal gradients and also showed that once in the channel, DNA can be symmetrically stretched under thermophoresis. This last procedure could be used to better expose the backbone of a nano-confined polymer to study its properties or the binding activity of some enzyme. We present a novel approach to model this symmetric stretch using blobs and the Flory free-energy of a polymer chain. Our model describes the monomer concentration profile reported in the aforementioned study. A value close to what is found in the literature is obtained for the Soret coefficient of the segments of dsDNA, characterizing thermophoresis. We further corroborate the validity of our model using molecular dynamics simulations. In these calculations, excluded volume interactions are shown to play a key role especially when temperatures are close to the solvent's θ value.

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