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Non-equilibrium tension propagation as a unifying description of driven polymer translocation TIMO IKONEN, TAPIO ALA-NISSILA, Aalto University School of Science, Finland, ANIKET BHATTACHARYA, University of Central Florida, WOKYUNG SUNG, Pohang University of Science and Technology, South Korea — We present results from a new Brownian dynamics model of driven polymer translocation[1], in which non-equilibrium memory effects due to tension propagation (TP) along the cis side subchain are included as a time-dependent friction. To solve the effective friction, we develop a finite chain length TP formalism, expanding on the work of Sakaue[1,2]. The model yields results in excellent quantitative agreement with molecular dynamics simulations in a wide range of parameters. Our results show that non-equilibrium TP along the cis side subchain dominates the dynamics of driven translocation. In addition, the model explains the different scaling of translocation time with chain length observed both in experiments and simulations as a combined effect of finite chain length and pore-polymer interactions.

[1]T. Ikonen, A. Bhattacharya, T. Ala-Nissila and W. Sung, submitted.
[2]T. Sakaue, Phys. Rev. E **76**, 021803 (2007)
[3]T. Sakaue, Phys. Rev. E **81**, 041808 (2010).

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