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**Ratchet rectification effect on the translocation of a flexible polyelectrolyte chain induced by spatial asymmetry of the channel** DEBASISH MONDAL, MURUGAPPAN MUTHUKUMAR, University of Massachusetts — We report a three dimensional Langevin dynamics simulation of a uniformly charged flexible polyelectrolyte, translocating through a asymmetric narrow channel with periodically varying cross-sections, under the influence of a periodic external electric field. When reflection symmetry of the channel is broken, rectification effect is observed with a favored direction for the chain translocation. For a given volume of the channel unit and polymer length, the rectification occurs only after a threshold frequency of the external periodic driving. We also observe that the extent of the rectification depends on the length of the polyelectrolyte, geometric parameters of the channel governing the spatial asymmetry, and the strength of the external periodic driving field. The observed rectification process is interpreted in terms of an effective asymmetric periodic potential along the direction of the polymer translocation.

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