Linkwise understanding of ASEP on the Bethe lattice

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We revisit the asymmetric simple exclusion process (ASEP) on the Bethe lattice, which was originally formulated as a simple model of transport on networks [1]. It was suggested that the process could be understood linkwise by estimating the entry and exit rates of each link from the occupancies of its end junctions. But our numerical observations at various system sizes imply that the asymptotic current–density relationship deviates from the prediction of this simple picture. In order to clarify the origin of such deviations, we numerically investigate the entry and exit statistics and density profile of each link. Using the results, we discuss how the previous picture based on linkwise dynamics can be improved.

[1] I. Neri, N. Kern, and A. Parmeggiani, Phys. Rev. Lett. 107, 068702 (2011).