Role of distance-dependent hopping in 1D TASEP with bottleneck

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According to bottleneck strength, macroscopic jam occurs in a driven diffusive system, which is known to the slow-bond problem[†]. By introducing the hopping rate depending on the distance l between two particles, $u(l) = 1 + b/l$, in the totally asymmetric simple exclusion process (TASEP) in a one-dimensional (1D) closed space with a defect, we numerically analyze various jamming patterns based on the fundamental diagram, the current, and density profiles as the defect strength varies. In particular, we focus on the inter-particle distance distribution $P(l)$ which characterizes not only jamming patterns but also condensation in the zero-range process[‡]. Finally, we argue that the sign of factor b affects jamming patterns.

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