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TASEP with extended particles and local inhomogeneities[1] JIAJIA DONG, BEATE SCHMITTMANN, ROYCE K.P. ZIA, Dept. Physics, Virginia Tech — Though much is known about the totally asymmetric simple exclusion process (TASEP), there are still non-trivial characteristics worthy of further exploration. In particular, in TASEPs with extended particles that "cover" $\ell > 1$ lattice sites, non-trivial correlations between the particles exist, even for a case with a trivial distribution for the microscopic configurations. Further, ξ, the characteristic length of these correlations can be extremely long, e.g., $O\left(10^2\right)$. They set up interesting structures in the density profile behind "bottlenecks" (localized inhomogeneities, with hopping rates q smaller than those in the rest of the lattice: $q < 1$) in the system. For TASEPs with open boundaries, we study how one or more such bottlenecks affect both the profiles and the overall current. Using simulations, we present results for a range of q, ℓ, and the *locations* of the inhomogeneities: x_i. For example, the current is somewhat enhanced if a single bottleneck is located close to either system boundary. But it is reduced significantly if two bottlenecks are present and closely spaced, i.e., provided $|x_1 - x_2| \leq \xi$. We also discuss the possible impact of these findings on ribosome queueing and codon optimization in protein production.

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