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Multi-point distribution of periodic TASEP

The height fluctuations of the models in the KPZ class are expected to converge to a universal process. The spatial process at equal time is known to converge to the Airy process or its variations. However, the temporal process, or more generally the two-dimensional space-time fluctuation field, is less well understood. We consider this question for the periodic TASEP (totally asymmetric simple exclusion process). For a general initial condition, we evaluate the multi-time and multi-location distribution explicitly in terms of a multiple integral involving a Fredholm determinant. With some assumptions on the initial condition, we evaluate the large time limit of this multi-point distribution in the so-called relaxation time scale.