Discrete thermodynamical modeling of traffic streams

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Abstract

Many of numerical schemes simulating a behavior of vehicular traffic systems have (contrary to realistic flows) space-discrete background. Although some discrete models (ASEP model, Nagel-Schreckenberg model, Fukui-Ishibashi model) have been found as appropriate traffic simulators it is broadly known that their microscopical features do not correspond to those detected in realistic traffic samples. Furthermore, such a discrepancy is strongly undesirable because it brings out many problems in model interpretation. On the other hand, certain microscopical traffic quantities (and their statistical distributions) were successfully predicted in the past years. Recently, local thermodynamical approaches applied to the particles of the traffic-like ensembles have led to the relevant analytical estimations (for example, estimations for distance headway distribution). Implementing such a new knowledge to the surviving cellular traffic models we introduce a new variant of one-dimensional lattice gas which is powerful in both, microscopical and macroscopical analysis of traffic.

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