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Nature of the Congested Traffic and Quasi-steady States of the General Motor Models BO YANG, Institute of High Performance Computing, XIHUA XU, National University of Singapore, JOHN Z.F. PANG, CHRISTOPHER MONTEROLA, Institute of High Performance Computing — We look at the general motor (GM) class microscopic traffic models and analyze some of the universal features of the (multi-)cluster solutions, including the emergence of an intrinsic scale and the quasisoliton dynamics (arXiv:1407.3177). We show that the GM models can capture the essential physics of the real traffic dynamics, especially the phase transition from the free flow to the congested phase, from which the wide moving jams emerges (the F-S-J transition pioneered by B.S. Kerner). In particular, the congested phase can be associated with either the multi-cluster quasi-steady states, or their more homogeneous precursor states. In both cases the states can last for a long time, and the narrow clusters will eventually grow and merge, leading to the formation of the wide moving jams. We present a general method to fit the empirical parameters so that both quantitative and qualitative macroscopic empirical features can be reproduced with a minimal GM model. We present numerical results for the traffic dynamics both with and without the bottleneck, including various types of spontaneous and induced "synchronized flow," as well as the evolution of wide moving jams. We also discuss its implications to the nature of different phases in traffic dynamics.

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