Influence of Density Fluctuation on the Stability of Single-Lane Traffic Flow By Cellular Automata

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Abstract

Cellular automaton (CA) models has been applied to simulate complex traffic systems. Various models are developed to understand single-lane traffic, multilane traffic, lane-changing behavior. To realize dynamic traffic management, a rapid and robust traffic CA procedure is necessary. Generally, traffic CA models are proposed based on the NaSch model, which is a four-step procedure. In this study, sensitivity of single-lane traffic flow is examined by traffic CA. According to the results, sensitivity decreases with density increases. The transient sensitivity is larger than steady-state sensitivity in the increasing profile; hence, transient simulation is still necessary. The transient sensitivity is equal to steady-state sensitivity in the decreasing profile. Although the sensitivity varies with density, the trend is stable and can be predictable.

Keyword：traffic flow; cellular automata; sensitivity