

Complex Behaviors of a Simple Traffic Model

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Abstract: In this paper, we propose a modified traffic model in which a single car moves through a sequence of traffic lights controlled by a step function instead of a sine function. In contrast to the previous work [Phys. Rev. E 70 (2004) 016107], we have investigated in detail the dependence of the behavior on four parameters, ω , α , η , and a_1 , and given three kinds of bifurcation diagrams, which show three kinds of complex behaviors. We have found that in this model there are chaotic and complex periodic motions, as well as special singularities. We have also analyzed the characteristic of the complex period motion and the essential feature of the singularity.

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Key words: traffic model, complex behavior, chaos, bifurcation diagram, singularity

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