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ACCEPTED MANUSCRIPT

Analysis of vehicle's safety envelope under car-following model

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Abstract: In this paper, we propose an improved car-following model to explore the impacts of vehicle's two safety distances (i.e., the front safety distance and back safety distance) on the traffic safety during the starting process. The numerical results show that our model is prominently safer than the FVD (full velocity difference) model, i.e., our model is better than the FVD model from the perspective of the traffic safety, which shows that each driver should consider his two safety distances during his driving process.

Keyword: Car-following model, safety envelope, headway, safety index.

1. Introduction

Recently, realistic acceleration has been an important requirement of traffic flow models, so there is a trade-off between realistic and analytical accelerations when choosing traffic flow model to study driving behavior. For example, Newell [1,2] proposed a car-following model that can give exact analytical solution; Laval and Daganzo developed a four-parameter and bounded-acceleration model [3]; another car-following models were proposed to explore driving behavior [4-27]. Therefore, it is necessary to propose a simple car-following model that can analytically be solved and

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