

## Accepted Manuscript

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PII: S0378-4371(13)00645-6

DOI: <http://dx.doi.org/10.1016/j.physa.2013.07.035>

Reference: PHYSA 14585

To appear in: *Physica A*

Received date: 22 May 2013

Revised date: 1 July 2013



Please cite this article as: T.Q. Tang, W.F. Shi, X.B. Yang, Y.P. Wang, G.Q. Lu, A macro traffic flow model accounting for road capacity and reliability analysis, *Physica A* (2013), <http://dx.doi.org/10.1016/j.physa.2013.07.035>

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# A macro traffic flow model accounting for road capacity and reliability analysis

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**Abstract:** Based on the existing traffic flow models, we in this paper develop a macro traffic flow model with consideration of road capacity to study the impacts of the road capacity on traffic flow. The numerical results illustrate that the road capacity will destroy the stability of uniform flow and produce stop-and-go traffic under the moderate density and that the road capacity will enhance the traffic risk coefficient and reduce the traffic system's reliability. In addition, the numerical results show that properly improving the road condition can enhance the road capacity, reduce the traffic risk coefficient and enhance the traffic system's reliability.

**Keywords:** traffic flow, road capacity, stability, traffic risk coefficient, reliability.

## 1. Introduction

To date, serious traffic problems (e.g., congestions, traffic accidents, traffic pollution, etc.) have attracted researchers to establish many traffic flow models to investigate the complex traffic phenomena from different perspectives [1,2]. Roughly speaking, the existing traffic flow models can be divided into macro models [3-13] and micro models [14-25]. Although these traffic flow models can reproduce many complex traffic phenomena,

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