



## 交通流Breakdown现象与交通扰动演化模型

### Traffic Breakdown Phenomenon and Evolution Model of Traffic Perturbation

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作者	单位	E-mail
<a href="#">郝媛</a>	<a href="#">同济大学 交通运输工程学院</a>	hao_silvia@126.com
<a href="#">孙立军</a>	<a href="#">同济大学</a>	
<a href="#">徐天东</a>	<a href="#">同济大学</a>	

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#### 中文摘要

建立了用以间接证明交通流自发breakdown现象的交通扰动演化模型。基于跟车思想制定了“继承”和“改变”两种车辆行驶规则；基于交通波动理论刻画了车辆经历扰动的减速波和加速波，并结合到达车流的车头时距分布，建立了扰动演化模型。模型考虑了“迟滞”现象和“二次扰动”现象，采用蒙特卡罗方法进行数值模拟，对比了五种形式的breakdown概率，分析了模型中重要参数对计算结果的影响及原因

#### 英文摘要

An evolution model of traffic perturbation is founded to verify spontaneous traffic breakdown phenomenon indirectly. Based on the principle of car following behavior, driving behavior is defined as two styles, "inheriting" and "altering". Deceleration wave and acceleration wave formed when vehicles drive in and drive out of a perturbation are calculated using theory of traffic wave. Driving behavior, deceleration and acceleration wave speed, and time-headway distribution of arriving traffic are used to found the evolution model of traffic perturbation. Hysteresis phenomenon and "secondary perturbation" are considered in this model. Numerical simulation is carried out using Monte Carlo method to calculate and contrast the probability of traffic breakdown (PB) of five models, and the impact of several important parameters on PB are analyzed.

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