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车祸模拟中的车速估算

黄小天

摘 要：现在台湾的机动车辆愈来愈普及，也使得车祸肇事率年年爬升，但一般民众却因为缺乏相关的信息、知识与专业，而无法取得对自己有利的证据，所以希望透过这次研究让车祸模拟能更平易近人。当在车祸现场的监视器中，无法直接取摩托车的车速，也无法使用标线或其他路边物品当作基准来估算车速时，选择在取得监视器里的现有信息后，直接到现场测量摩托车开始煞车到撞击之间的距离，进而利用公式推算出摩托车在煞车前的车速，最后再利用pc-crash交通事故仿真软件进行车祸仿真，验证利用公式所估算出来的车速是否正确。利用公式算出来的车速输入pc-crash车祸仿真软件，进行仿真后，得到结果与实际监视器画面相同，得此证明。先使用公式估算出速度，不仅能得知驾驶者是否超速，且能够在操作pc-crash软件时更加快速且精准，不需要因为没有大概的速度值，而必须一次又一次的重复测试与验证结果；在车速估算方面提供另外一种较为容易的方式。

关键词：监视器，车速，pc-crash

Estimation of Vehicle Speed in Traffic Accident Simulation

Huang Xiaotian

Abstract: Now in Taiwan vehicles are more and more common, also makes the accident rate climbs every year, but the general public is lack of related information, knowledge and profession, that couldn’t get the useful evidence for themselves, so hope that through the research can let the accident simulation more approachable. When in the monitor couldn’t get the speed of the scooter directly, and couldn’t use any marking lines or objects that beside the road as a benchmark to calculate the speed of the scooter, choose to get the information in the monitor that is helpful for the research, then measure the distance between the scooter starts offering the brakes and crashes into the car on site, then can calculate the speed of the scooter before it offers the brakes, last use pc-crash the software which can
simulate car accident to simulate the car crash, verifying the speed of the scooter that calculates by the formula if its correct or not. Input the speed which calculates by the formula into the car crash simulation software pc-crash to simulate, receive the result that is same in the monitor, proves this. Calculate the speed by the formula first, not only can learn that if the driver have exceed the speed limit or not, but also can let the simulation on the pc-crash software more quick and accurate, because have the appropriate speed, so don’t need to test and verify repeatedly to get the most accurate value; on the speed estimation side provides another easier way to calculate.

**Keywords:** monitor, speed, pc-crash

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Analysis of the Influences on Metro, the Built Environment, and Residential Preference on Walking

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ABSTRACT

In order to reduce people's dependence on cars, planners are increasingly promoting active travel. It is clear that rail transit promotes walking to the extent that passengers access station by walking. Few studies focus on the carryover effects on metro and associated the features of the built environment on additional walking travel. In this paper, to investigate the influences on metro and built environment on frequencies of utilitarian walking (shopping trips) and recreational walking (strolling), we select 1,357 residents of five corridors from Nanjing City, Jiangsu Province. The results of the two negative binomial regression models showed that shopping trips are closely related to population density, commercial land use, and street network disruptions after controlling for demographics, travel attitudes, and residential preferences. Strolling is also associated with street network interruption. These studies are of great significance for the planning of rail transit.

Keywords: utilitarian walking, recreational walking, metro, the built environment, negative binomial regression
Analysis of Factors Influencing Choice of Bicycle Commuting

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ABSTRACT

Bike infrastructure and the travel environment have effects on people’s decisions to commute by bicycle. There are many studies have considered this issue, but the general methods fail to solve bicycle with small mode shares. In addition, individual characteristics that are not adequately accounted for may lead to overestimation of built environment impacts. This paper will use the Heckman selection model to estimate bicycle frequency, demographics, residential preferences, and travel attitudes. Indicating that attitudes have important influence on the availability of bicycle. And bike lanes should be used to attract cyclists to a neighborhood, rather than encouraging people who do not bicycling to change their way to travel. These results have an impact on policymakers attempting to develop bicycle infrastructure.

Keywords: Bicycling, Bicycle commuting, Travel behavior, Model choice
Research on Field Survey Approach and Result Analysis about Public Transit Current Operation Situation in Medium and Small-Sized Cities

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Abstract: Public transit is the most fundamental public transportation mode in medium and small-sized cities. Public transit field research is helpful to understand the current operation situation and we can put forward relevant suggestions and opinions to improve the operation, also it lays a foundation for future urban rail transit construction. In this paper we gave the indicators and field research methods for the small and medium-sized city bus operation, from the planners and designers’ perspective. We took Longyan city’s bus field survey as an example, compared and analyzed the sharing rate of bus travel in Longyan, Pingdingshan, Yichang and Xiangyang city, and put forward related suggestions and
opinions on urban public transport development based on the analysis results.

**Keywords:** public transit operation; medium and small-sized cities; field survey approach; development proposals; planning and design

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Exploring the Sources and Reasons of the Excess Car Travels

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ABSTRACT

From the increasingly crowded traffic conditions, the travel ratio of driving car in Chinese city has been high. The Chinese people choose to drive a car more than ever before, and the problem of congestion has become one of the residents most concerned about travel problems. While it has been advocated to reduce congestion by reducing car travels and increasing the choice of modes of public transport, it is not clear what the distinction is between the need and the choice of car travels. By exploring the relevant factors of the excess car travels, this paper explores the underlying causes of congested automobile traffic, and wants to improve the urban traffic conditions and makes a more perfect urban transportation system. In this paper, a detailed survey of the interviewees about the choice of destinations, modes of travels and psychology at the time of a car trip is made through an interrogative survey, which distinguishes between extra car trips and satisfying basic driving travels. The investigation of this paper will help us to understand people's travel behavior deeply and provide the basis for alleviating congestion and reducing the number of cars on the road.

Keywords: congestion, excess car travel, travel habits, investigation
一种简便的停车场特性调查方法——分段式连续观测法

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摘 要：停车调查是停车场规划、设计以及评价的基础工作。传统的牌照式连续观测法调查精度高，但存在调查强度大，数据处理工作量大等问题。本文提出的分段式连续观测法简便易行，调查强度低，数据处理简单，计算结果显示该方法精度较高。当停车场的车辆到达率较大时，n的取值可放低至6；当车辆到达率较低时，建议n的取值不低于10。

关键词：停车调查；利用率；周转率；平均停车时间；牌照式；分段式

A Simple Survey Method for Parking Lot’s Characteristics: Segment-based Day-night Observation Method

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Abstract: Parking survey is the basic work of parking lots planning, design and evaluation. The traditional license-plate-based day-night observation method has a high precision, but it has many problems such as large investigation intensity and large data processing workload. A new method called segment-based day-night observation method proposed in this paper is simple and easy to carry out with low investigation intensity and low data processing workload. Furthermore, the result shows that the method is of a relatively high precision. When the arrival rate of vehicles in the parking lot is relatively high, the value of n can be reduced to 6. On the contrary, the recommended value of n is not less than 10.
**Keywords:** parking survey; utilization ratio; turnover rate; mean parking time; license-plate-based; segment-based

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机场跑道交通量纵向分布研究

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摘   要：针对当前对机场交通量分布认识不全面的问题，本文重新审视现有机场道面交通量分析方法，提出了机场交通量纵向分布的概念并加以量化，确定了以不同横截面飞机通行次数的差异来表示机场交通量纵向分布的分析思路，同时引入了比例因子方便计算；根据现有的测试结果分析了机场交通量纵向分布规律，确定了其分布的正态性；分别对飞机起飞着陆的交通量纵向分布进行分析，得出了两种情况下交通量纵向分布的数学方程；最后分析了跑道交通量纵向分布的影响因素，发现飞机种类与性能、跑道两端起降概率以及跑道长度等几个方面对跑道交通量纵向分布有较大的影响。

关键词：跑道交通量；纵向分布；数学方程；影响因素

中图分类号：U238

Research on Longitudinal Traffic Distribution of Airfeld Runway

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Abstract: Targeting the lack of knowledge of airport traffic distribution at present, this paper reviewed the existing analyzing methods of airport pavement traffic, put forward the concept of vertical distribution of airport traffic and furthermore quantified the concept, determined the analyzing structure in which the vertical distribution of airport traffic is shown by the differences among airplane passing frequencies of different sections, and a scale factor was introduced for the convenience of calculation. Based on the existing test results, the pattern of vertical distribution of airport traffic was analyzed and its normality has been determined. Analyzes targeting vertical distribution of traffic under both
take-off and landing situations have been conducted, and mathematical equations considering vertical distribution of traffic under both situations have been obtained. At last, influence factors of vertical distribution of runway traffic have been analyzed, in which types and performances of planes, take-off and landing probabilities on both sides of a runway and the length of the runway itself have shown great influences on vertical distribution of runway traffic.

**Keywords:** runway traffic; vertical distribution; mathematical equations; influence factors

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Research of Urban Ecological Traffic Evaluation Based on the BP Neural Network

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ABSTRACT

This paper discusses the system of urban ecological traffic coordination theory based on traffic network, traffic safety, traffic environment, traffic landscape and traffic culture. Using an existing evaluation method that is fundamental to sustainable urban traffic development, this paper builds an additional set of indices that focuses on urban ecological traffic. The urban ecological traffic evaluation model is built based on BP neural network and the evaluation model parameters are determined through the analysis research. Finally, the feasible evaluation program is given. Using the collected ecological traffic evaluation index data of Zhuhai city, obtained through the established urban ecological traffic evaluation model, it is concluded that the ecological traffic level score ranking results of four urban is: Haikou, Rizhao, Zhuhai, Yuxi. This conclusion verifies the accuracy of the proposed evaluation model.

Keywords: urban ecological traffic; ecological traffic evaluation; index system; BP neural network
基于大数据的城市交通运行态势感知

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摘 要：全面准确地感知整个城市交通运行态势是城市交通诱导、控制和优化的基础。随着城市交通化进程的加快，实现交通流数据采集、号牌识别、交通事故检测、交通违法行为拍摄的视频监控设备、城市浮动车的GPS设备以及手机基站等设备逐渐完善，每天能够采集到大量反映交通运行态势的基础数据。

本文在分析浮动车数据、视频监控数据以及手机信令数据提取交通运行态势参数的基础上，提出基于大数据的城市交通运行态势感知方法，并结合成都市的浮动车数据、视频监控数据以及手机信令数据，验证方法的有效性，结果表明基于大数据分析技术可以准确的、时空全覆盖的感知城市交通运行态势。

关键词：交通运行态势；浮动车；视频监控；手机信令；行程车速；旅行时间

中图分类号：U491

Urban Transportation Situation Awareness Based on Big Data

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Abstract: Round and accurate perception of the whole urban transportation situation is the foundation of induction, control and optimization of the urban transportation. With the accelerating of information process of urban transportation, the video supervising equipment which achieves collection of traffic flow data, plate number recognition, traffic incident detection and snapshot of traffic violation is gradually mature. As well as the improvement of floating car GPS equipment and mobile phone station, plenty of basic data that reflect the transportation situation can be collected. This paper which is based on the analysis of floating car data, video supervising data and mobile phone signaling data, and the extraction of transportation situation parameters, puts forward urban transportation situation
awareness method. This paper combines Chengdu’s floating car data, video supervising data and mobile phone signaling data to show that urban transportation’s situation can be aware accurately based on big data analysis technology.

**Keywords:** transportation situation; floating car; video supervising; mobile phone signaling; travelspeed; travel time
机动车信号倒计时装置对交通安全影响分析

卢冬生, 李慧颖, 张腾

摘 要：机动车信号灯倒计时装置作为一种交通控制设备，被国内多数城市广泛应用。机动车倒计时装置对驾驶员在交叉口以及交叉口附近的行车速度有着显著影响，通过对有无机动车信号灯倒计时装置下停车线断面地点车速，停车线前30米断面地点车速和区间车速的对比分析，剖析机动车倒计时装置对行车安全性提升的作用。并且通过对交叉口交通冲突进行分析，指出机动车信号灯倒计时装置的局限性。基于此，为机动车倒计时装置更好的提升交通安全性提供可靠参考。

关键词：信号灯；倒计时装置；车速；交通冲突；交通安全

中图分类号：U491.1 文献标志码：A

Impact of Motor Vehicle Signal Countdown Displays on Traffic Safety

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Abstract: As a kind of traffic control equipment, motor vehicle signal countdown displays are widely used in major domestic cities. Drivers are significantly affects by these equipments in near the intersection and intersection. Through the analyses of speed of stop-line section, speed of before stop-line 30 meters section and interval speed, we can find the impact of motor vehicle signal countdown displays on traffic safety. In addition, by the analyses of traffic conflict, we can put forward the limitations of motor vehicle signal countdown displays. According to the above, it can provide reliable basis for motor vehicle signal countdown displays to better achieve the traffic safety.

Keywords: signal light; countdown displays; speed; traffic conflict; traffic safety
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基于典型相关分析的区域交通运输与经济发展协调性研究

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摘 要：我国区域交通运输与区域经济发展之间存在密不可分的关系。而这种关系是通过不同影响要素之间的协同性效用体现出来的。论文在已有研究的基础上，构建区域交通运输与区域经济发展协调性评价体系，基于典型相关分析法建立“交通运输-区域经济”协调发展评价模型，借助SPSS等相关工具，对四川省交通运输与区域经济协调发展关系进行分析，打破传统方法探寻系统间协同性的不足，通过数据分析出抑制系统间协调性的关键因素，为不协调发展之处提出科学性的改进建议。

关键词：区域交通；区域经济；协调性；典型相关分析；SPSS

Study on the Coordination between Regional Transportation and Economic Development Based on Canonical Correlation Analysis

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Abstract: There is inseparable relationship between regional transport and regional economic development. This relationship is showed through the effect of coordination among different factors. Based on the existing research; this essay constructs an evaluation system about the coordination between regional transportation and regional economic development, and establishes an evaluation model of the coordination development of transportation and regional economy. Finally, this article analyses the harmonious coordinated development relationship between transportation and regional economy in Sichuan with SPSS and other related tools. It improves the original method by seeking the coordination relationship among factors of each subsystem, and puts forward some scientific suggestions to improve the uncoordinated development.
Keywords: Regional transportation; regional economy; coordination; canonical correlation analysis;

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基于PEMS的高原城市道路交通状态评价及排放相关性实验研究
——以西宁市为例

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摘 要: 应用PEMS技术测试了西宁市典型道路及其路段的交通状况，提出了基于PEMS的路段、行程、行程时间、行程平均车速、自由流行程时间、行程时间延误率以及行程平均速度延误率等概念和计算方法，研究了基于行程时间延误率、行程平均速度延误率的城市道路路段交通状态判别方法，并对典型道路及路段交通拥堵进行分析判别。同时，研究了城市道路路段交通状态与车辆排放量之间的相关关系。

关键词: PEMS; 交通; 状态; 排放; 相关性

Experimental Study on State Evaluation and Emission Correlation of Urban Road Traffic in Plateau Based on PEMS: A Case Study of Xining

Ma Shengyuan, Deng Junfei, Ma Zhengfeng, Guan Hongzhi
Abstract: The transportation situation of Xining city’s classic highway and anothers have been tested by PEMS skill, to make out a series of concepts and computing methods that distence of travel, travel time, average travel speed, free flow travel time, travel time delay rate and travel average speed delay rate on PEMS tested highway. The research find out the transport condition discriminated method by travel time delay rate and travel average speed delay rate, and to discriminate traffic jam on a section of classic highway, to analyze experimental vehicle’s discharge (including Pollutants in exhaust gas) correlativity.

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Impacts of Metrolink Phase 1 on Travel Behavior and Traveller’s Characteristics in Greater Manchester

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ABSTRACT
A self-completion questionnaire data of 2588 individual travelers based on light rail and heavy rail travel in 1993 and 2011 census data was used to make a help to analyze a short-term impact of Metrolink Phase 1 which was opened in 1992 on people’s travel behaviours, including converting mode choice from car to rail and attracting more people travel to central Manchester by taking light rail which may bring regeneration in city centre. In this paper, chi-square test was delivered to test the hypotheses and make cross-tabulation forms to display correlation between categorical variables. In addition, this paper explores the socioeconomic characteristics of rail users, and put more emphasis on discovering common characteristics of light rail passengers. Through comparison, We found that people who always bought peak return ticket and off-peak return ticket, were from age 14-54, employed or self-employed workers, housewives, or retired were more likely to choose light rail.

KEYWORDS: transport analysis, light rail, travel behaviour, socioeconomic characteristics, before-after impacts, chi-square test
公路交通对县域经济发展影响的实证研究

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摘 要：公路交通建设对于县域经济的快速发展起着至关重要的作用。但随着近年公路交通的快速发展，县域经济发展水平差异化愈加明显。为深入探其原因，更好阐述公路交通发展与县域经济间存在的相关关系，选取山东省章丘市作为典型代表，从公路交通与三大产业经济及国民经济的相关性为出发点，基于实地调研的基础上，采用定性与定量分析相结合等多方法进行实证分析，并提出进一步促进地区经济发展的合理性政策建议，对公路交通的可持续发展和县域经济平稳快速发展的实现具有重要意义。

关键词：公路交通建设；县域经济；相关性分析；可持续发展

中图分类号：U-9

Research on the Impacts of Highway Traffic Empirical with the Development of County Economy

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Abstract: The highway traffic construction plays an important role of rapid development of the county economy. But with the rapid development of highway traffic in recent years, the differentiation of county economy development level are becoming more obvious. To further explore the causes, and analysis the the relationship of development with highway traffic and county economy, this paper choose the Zhangqiu in Shandong province as a typical representative, from the correlation of the three major industrial economy, the highway traffic and the national economy, based on the on-the-spot investigation, it make a substantial study by many method, such as combination with the qualitative and quantitative analysis methods, and so on, besides, it put forward the reasonable policy recommendations
with promote the development of regional economy, it is very important with implementation of the sustainable development of highway traffic and the steady, the rapid development of county economy.

**Keywords:** highway traffic construction, county economy, correlation analysis, sustainable development

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公路桥梁工程承重支架应用现状调研与分析

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摘 要: 承重支架工程是公路现浇桥梁一种常用的施工方法，其质量和安全问题被日益关注。本文通过承重支架施工现场调研和构配件技术指标检测，了解目前承重支架应用现状，总结碗扣支架构配件技术指标存在的问题，为公路桥梁工程的承重支架安全施工提供可靠统计数据和理论依据，并针对承重支架安全施工提出有效建议。

关键词: 承重支架; 碗扣支架; 调研; 检测; 安全

Highway Bridge Engineering Analysis of the Support Scaffold Application Status

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Abstract: Support scaffold engineering is a commonly used construction method for cast-in-place highway bridges. Its quality and safety issues are increasingly concerned. Through field investigation and some tests of technical index of support scaffolds, their application status are studied, the technical index problems of cuplock scaffolds are listed, reliable statistical data and theoretical basis are provided, and finally some effective suggestions for the safe construction of support scaffolds are proposed.

Keywords: Support scaffold; Cuplock scaffold; Research; Detection; Security

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基于无人机视频的城市出入口立交通行状态判别方法研究

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摘 要：城市出入口立交的通行状态是影响城市交通管理与出行诱导策略的重要因素，传统的路面监控手段采集交通信息有一定局限性，通过无人机航拍采集的视频与路面监控视频相比具有更大的监视范围，可以观测整个立交的交通运行情况。本文基于无人机视频提出一种城市立交大范围交通参数提取及通行状态判别方法，首先通过背景建模优化方法提取无人机悬停航拍视频中的立交交通参数；随后利用图像特征匹配方法校对不同拍摄角度与实际立交位置图；最后，结合城市出入口交汇特点建立通行状态判别模型，以期为解决城市出入口交通诱导问题提供决策依据。

关键词：城市出入口；无人机；交通信息采集；交通状态判别

中图分类号：U491.1

Research on Traffic Status Discrimination of Urban Entrance Interchange Based on Unmanned Aerial Vehicle Video

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Abstract: The traffic status of urban entrances and exits is an important factor influencing the urban traffic management and travel induction strategy. It is limited by the traditional road monitoring methods to collect traffic information. The video collected by UAV aerial photography is larger than that of road surveillance video of the monitoring range, which can observe the entire interchange traffic conditions. In this paper, a large-scale traffic parameter extraction and traffic status discrimination
method is proposed based on UAV video. Firstly, the traffic parameters in UAV hovering aerial video are extracted by background modeling and optimization method. Then, the image matching method is used to calibrate the different shooting angle and the actual intersection position map. Finally, the traffic status of the identification model was established, which Combined with the characteristics of urban entrances. This paper aims to provide a basis for solving the problem of urban entrances traffic induction.

**Keyword:** urban entrance; unmanned aerial vehicle; traffic information collection; traffic status discrimination.

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基于乘客感知的公交满意度评价指标体系构建方法研究

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摘要：公共交通作为城市居民的重要出行方式，随着城市的发展和人民生活水平的提高，其服务理念与服务水平也在面临着巨大的考验。研究通过分析城市公交系统的乘客服务需求，结合指标体系的构建原则，在明确指标体系结构的基础上，对志愿者进行调研，从而构建了以时效、安全、可靠、便捷、舒适和经济这6项影响乘客满意度的关键因素为一级指标，21个二级指标，77个三级指标的多层次基于乘客感知的公交满意度评价指标体系，并通过2998份问卷调查对指标体系的信度和效度进行检验，其中，各指标的克朗巴哈α系数均高于0.7，共同度都大于0.5，结果表明，本研究构建的地面公交乘客满意度评价指标体系具有较高的可靠性和有效性，指标体系设计合理。研究为未来开展定量化的公交满意度评价，提高城市公共交通服务水平和满意度提供支撑。

关键词：公共交通, 公交满意度, 评价指标体系, 乘客感知, 信度效度检验

中图分类号：U491

A Method of Building Bus Satisfaction Evaluation Index System Based on Passengers' Perception

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Abstract: Public transportation as an important way of urban residents’ travel, with the development of the city and the improvement of people's living standard, the service concept and service level are also facing a huge test. Through the bus passenger’ service requirements analysis, combined with the index system building principles, on the basis of definite the index system structural, researching the volunteers, and building bus satisfaction evaluation index system based on passengers' perception...
including 6 first-level indicators which are the key factors influencing the passenger satisfaction: timeliness, security, convenience, comfort, reliability and economy, 21 second-level indicators and 77 third-level indicators. The test of the reliability and validity through 2998 copies of questionnaires on the index system, showed that the Cronbach's Alpha of each index is higher than 0.7, and the Communalities are greater than 0.5. It represents that the bus passenger satisfaction evaluation index system is high reliability and validity, and the design is reasonable. Research provide support for the future to carry out the quantitative bus satisfaction evaluation, improve the services level and satisfaction of urban public transport.

**key words:** public transportation; passenger satisfaction; evaluation index system; passengers' perception; reliability and validity test

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The Passengers Influence of Chinese Drivers Based on Questionnaire Survey Data

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ABSTRACT
In order to investigate the influence of passengers on drivers, and to comprehend the psychological feelings of drivers when accompanied, a detailed questionnaire survey is designed and performed on the 209 drivers in China. The in-depth statistics and analysis on the data of questionnaires are carried out and drivers’ actual experiences of passenger carrying are obtained. The factors related to the presence of passengers in vehicles, e.g. their number, age, seated position, relationship with drivers, are associated with drivers’ main factors like age, gender and driving years. Also the drivers’ likes and dislikes for their passengers are explored. The results reveal that the impact of passengers’ typical characteristics on drivers’ behavior and emotion, and find that gender is the most influential factor. The research findings may provide a useful reference for the construction of a relevant scenario and the improvement of driving safety.

KEYWORDS: passenger, driver, questionnaire survey, statistics
基于空间句法的扬州老城区慢行交通网结构研究

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摘 要：近年来，由于城市化的快速推进，交通拥堵问题逐渐显现出来，而对于老城区来说，其人口密度较大且道路较窄，交通问题更为突出，因此发展慢行交通变得尤为重要。本文重在基于空间句法研究扬州老城区慢行网络结构，首先针对慢行交通网络的研究方法和思路进行阐述，并通过空间句法的整合度、平均深度、理解度以及街网密度对扬州老城区慢行交通网络进行分析，最后总结扬州老城区慢行网络的特征，为扬州老城区规划及改善提供依据。

关键词：空间句法；慢行交通网络；整合度；平均深度；理解度；街网密度

中图分类号：U238

Space Syntax Based Study on the Slow-moving Traffic Network Structure of the Old Districts of Yangzhou City

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Abstract:In recent years,as a result of the rapid urbanization,trafficjam problems gradually emerged,however,for the old town,Its population density is bigger and the road is narrow, the traffic problem is more prominent.Therefore, the development of slow traffic has become particularly important.This paper focuses on the study of the slow network structure of Yangzhou old town based on Space Syntax.Firstly, the research methods and train of thought for the slow traffic network are expounded,and through the integration of space syntax, average depth, understanding and street network density, the paper analyzes the slow traffic network of Yangzhou old town.Finally, the paper summarizes the characteristics of the slow network in the old city of Yangzhou, and provides the basis
for the planning and improvement of the old city of Yangzhou.

**Keywords:** Space syntax; Slow traffic network; Integration; Average depth; Understanding; Street network density

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The Study on the Behaviour of Slow Mode Transportation in Suzhou Based on Activity Analysis

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ABSTRACT
Based on the activity analysis method, a binary Logit selection model is established based on the slow mode transportation survey data of Gusu in Suzhou, Jiangsu Province. According to the characteristics of slow mode transportation, we divided the types of slow mode transportation
activities to determine the factors that affect the slow mode transportation activities. By calculating the influencing factors, we obtained the modes of different slow mode transportation types select probability. The results show that various factors have different effects on the choice of slow mode transportation activities. In the condition of flexible demand and short-distance traffic, slow mode transportation has a great advantage.

KEYWORDS: Slow Traffic; Logit Model; Travel Behaviour; Activity Analysis
改进的多道瞬态瑞雷波探测方法在隧道超前预报中的应用

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摘 要：受波动问题空间采样率观念的限制，现有多道瞬态瑞雷波探测方法采用小道间距、多道检波器排列方式观测同一次激发的瞬态瑞雷波，虽然解决了同时观测不同频率成分波动的问题，但一个排列的多道检波器只能得到一条瑞雷波相速度—探测深度曲线，工作效率和横向分辨力受到极大限制。针对现有方法的弱点，在阐明道间时差相位概念和意义的基础上，本文介绍改进的多道瞬态瑞雷波探测成像方法，该方法只需要两道相邻检波器记录的波动数据即可提取多种频率成分的瑞雷波相速度，完成现有瞬态瑞雷波探测方法需要一个排列的多道检波器才能完成的工作。该方法用于贵阳市地铁1号线右线隧道的超前预报探测，目的是查明隧道开挖前方范围内可能存在的破碎带、岩溶洞穴等渗水通道的位置，为隧道开挖施工提供依据。最后工程开挖验证结果与探测结果表明了该方法对地铁工程问题探测的有效性。

关键词：多道瞬态瑞雷波探测；道间时差相位；相速度成像；隧道超前预报；岩溶裂隙

中图分类号：P631.4+2 文献标志码：A

An Improved Detecting Method of Multichannel Transient Rayleigh Wave and its Application in Advancing Prediction of Tunnel

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Abstract: Limited by the concept of spatial sampling rate in wave problems, the existing multichannel transient Rayleigh wave exploration technique observes the transient Rayleigh wave excited at a single blow with an array of multichannel geophones of small channel spacing. The method does realize the observing and recording of the waves with multiple frequency components simultaneously, but it can only get one curve of phase velocity vs. depth with an array of multichannel geophones, therefore, its work efficiency and lateral resolution power are greatly limited. In order to overcome the defects, this paper introduces the improved method of multichannel transient Rayleigh wave. This method can extract the phase velocities of different frequency components from only two adjacent channel waveforms of transient Rayleigh waves recorded on two adjacent detecting points, which used to be the work with a multichannel array of geophones. The method has been applied to detect karst zones and fracture zones in right tunnel of Yan’an Road station on NO.1 of Guiyang Metro. The purpose is order to find the positions of water-abundant belt, such as karst zones and fracture zones that will be provided to guide the tunnel construction. Comparing the detecting results with the graph of excavated validation show that the new approach introduced in this paper is effective to problems of engineering geology detecting.

Keywords: Multichannel transient Rayleigh wave detecting; Time difference phase between channels; Phase velocity imagining; Advanced prediction in tunnel construction; Karst zones

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Research on Wear Rate Prediction Model of Beijing Metro Copper Alloy Collector

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ABSTRACT

Beijing metro adopts the combination of contact rail and collector to supply the electricity, however, many disadvantageous factors have caused by the wear loss of the collector, such as poor contact between the contact rail and collector and the spark caused by the collector friction. Line 1, Line 13 and Line batong has employed the copper alloy collector. This paper researches the wear law of copper alloy collector in metro operation, which can provide valid basis for double-sided copper alloy collector wear analysis. According to the form of the Archard wear model and wear data of line batong, copper alloy collector wear rate formula was obtained, it is concluded that the wear rate and
contact pressure have linear relation. Combined with wear data of Line 1, Line 13 and linear fitting tools in Matlab, the copper alloy collector wear rate formula has been modified. The modified wear formula is better to predict the wear rate of copper alloy collector in Beijing metro.

**KEYWORDS:** Metro copper alloy collector, Wear rate, Archard wear model, Wear rate prediction
国际机场客运量预测与新航线开拓研究—以深圳机场为例

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摘　要：本研究分别从区域经济发展环境、经济开放度、旅游业发展环境、政府财政能力、国际投资环境、机场自身运营能力等六个影响因素出发，应用ARIMA与CD函数模型通过计量分析对2015-2020年深圳机场国际客运量数据进行预测。并在此基础上，结合深圳经贸、旅游以及香港、广州国际航点数据，对拟开通国家、地区以及航点进行优先排序，最终通过权值法确定新航线具体航点城市。

关键词：国际客运量；新航线开拓；AMRA模型；CD函数模型；深圳机场

中图分类号：F562.3,F560.3 文献标志码：A

A Study on Forecast of International Passenger Traffic and Development of New Routes in Shenzhen Airport

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Abstract: Based on the six factors, named regional economic development environment, economic openness, tourism development environment, government financial capacity, international investment environment and airport operation ability, we uses ARIMA and CD function model to predict the 2015-2020 Shenzhen airport international passenger volume data. And on this basis, combined with trade, tourism of Shenzhen and Hong Kong’s, Guangzhou’s international destinations data, to prioritize the countries, regions and destinations which are to be opened, and ultimately through the weight method to determine the specific city of new route destinations.
Keywords: International passenger volume; development of new routes, ARMA model; CD function model; Shenzhen Airport

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Design of IP Tunnel Emergency Telephone and Wired Broadcasting System with Early-warning Mechanism Based on Video Linkage

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Abstract: This paper proposed the design and implementation of IP tunnel emergency telephone and wired broadcasting system with early-warning mechanism based on video linkage, especially analyzed the flow for the implementation of early-warning mechanism and also provided the guidance for the signal transportation problem and network security problem.

Keywords: video linkage; early-warning mechanism; IP tunnel emergency telephone and wired broadcasting system; intelligent transport monitoring and controlling platform
Ecological Landscape Design of Hengshui Lake National Wetland Based on BIM

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Abstract: This paper takes the landscape design of Hengshui Lake national wetland road facilities as the design content, taking ecology, environmental protection, energy saving and low carbon as the design concept, taking BIM as the main design tool, Hengshui Lake along the road infrastructure for internal and external landscape design. The design takes into account its functional requirements, the impact on the environment, as well as the psychology of drivers and passengers, through reasonable environmental landscape design, to minimize the damage to the environment, and integrated Hengshui Lake National Wetland The natural landscape and human history, and other factors, so that tourism
and transport infrastructure in Hengshui Lake National Wetland landscape a new bright spot, so that the landscape design and scenic spots to achieve a harmonious unity to achieve the coordinated development of scenic spots and tourism.

**Keywords**: Hengshui Lake National Wetland; BIM; Road facilities; Landscape Design

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多功能应急保障车设计应用方案

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摘   要：为了提升公路应急救援综合能力，保障救援机械高效运转，开发了一种多功能应急保障车，主要用于冬季大型应急救援机械的辅助启动，其他还可用于应急照明及日常照明；公路野外施工与救援现场一般用电及办公设备的供电；有、无电源场所为其他（车载）蓄电池进行充电；其他用电设备如警报器、LED指示牌、扩音器、探照灯的扩展使用。

关键词：多功能；应急保障车；方案

Design and Application of Multifunctional Emergency Vehicle

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Abstract: To improve the comprehensive ability of highway emergency support and high efficient performance of support machinery, a multifunctional emergency support vehicle has been developed. It is mainly applied to the auxiliary start of large emergency support machinery and emergency illumination and general illumination. In addition, it also supplies general electricity for highway outdoor construction, rescue scenes and office facilities. Moreover, the support vehicle charges electricity to other storage battery in the place with or without electricity. The other equipment includes alarming apparatus, LED indicator board, helicopter and searchlight.

Keywords: multifunction; emergency vehicle; scheme
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Study on Invulnerability of Expressway Network Based on Complex Network

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ABSTRACT

Based on complex network theory, invulnerability of the highway network is analyzed. The topology model of a regional highway network is built by using the dual method. Some parameters of the topology network are calculated such as the node degree, average path length, clustering coefficient, overall efficiency and so on. The topology construction is quantitatively analysis. Under the random attack and selected attack patterns, the invulnerability of a highway network is studied. Relevant value of maximum connected subgraph and overall efficiency are regarded as two important parameters of invulnerability of network. It can be concluded that the destruction of network occurs until a large proportion of nodes were attacked under the random attack, while network will be destroyed soon under selected attack.

Keywords: Traffic engineering; Invulnerability; complex network; topology
Tourism Service of Cultural Landscape Based on Mobile Internet

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ABSTRACT

Mobile Internet is a part of the technological revolution which can vastly increase the quality of tourist attractions you can get done in any given time, or it can improve the services in which you are able to visit. The emerging mobile APPs are tailored to mobile device users and promise to substantially enrich tourist experiences, recommending rich multimedia content, context-aware services, views/ratings of peer users, etc. This article follows a systematic approach in reviewing the state-of-the-art in the field, proposing a result of an exploratory study about Mobile Applications (APPs) of natural scenic area and providing insights on their offered services. We also focus on building a travel integration information system in the domain of mobile internet because we assumed that as characteristics of tourism services become increasingly sophisticated, the information platform could be a key factor of travel services usage. It also highlights challenges and promising research directions with respect to mobile internet employed in tourism.

KEYWORDS: tourism; mobile internet; application (APP); tourist guide
新时期高速公路服务区发展之路

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摘 要: 本文在总结国内外高速公路服务区发展现状的基础上, 分析了我国高速公路服务区的不足和国外优秀服务区的特征。根据交通运输部提出的提升服务区服务质量要求, 结合高速公路服务区自身特点, 利用高速公路上人流、车流量的优势, 探索未来我国高速公路服务区建设的发展方向。

关键词: 高速公路; 服务区; 发展

Expressway Service Areas’ Development in the New Period

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Abstract: This paper analyzes the deficiencies of expressway service areas in our country and the characteristics of excellent foreign expressway service areas, based on summarizing the current situation of expressway service areas’ development. According to the Ministry of Transport’s requirement for improving the quality of service areas, this paper discusses national expressway service areas’ development in the future with expressway service areas’ characteristics, making use of the advantages of traffic and people flow.

Keywords: expressway; service areas; development

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The Vulnerability Identification of Urban Road Network under Unexpected Congestion Condition

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ABSTRACT
In order to quantify variety of urban road network vulnerability caused by unexpected congestion, firstly the original method is used to analysis topology structure of road network, and two road network performance indexes, connectivity and network efficiency, are used to evaluation road network robustness in medium view. And then, considering link’s queuing capacity constrain on unexpected congestion condition, setting the variety of road network impedance as vulnerability identification index, and establishing a network traffic flow model with link queuing capacity constraint. Finally, the Lagrange Dual Algorithm is designed to solve model and the accuracy of model was tested by an example. The result shows that the model based on vulnerability index can accurately
recognize road network vulnerability. The invalid links caused by unexpected congestion will lead to change road network impedance that directly affects the robustness of whole road network.

**KEYWORDS:** traffic engineering; vulnerability identification; Lagrange dual algorithm; unexpected congestion; traffic assignment
Design of Traffic Engineering Scheme for Overloading Inspection Station of Guangle Expressway in Guangdong Province

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Abstract: Compared with normal vehicle overload detection station, Yuebei Vehicle Overload Detection Station has its own specificity: built beside the service area close to an expressway hub interchange; with large traffic. As a result, in this paper, the construction scheme of the station has been fully demonstrated. And all of the specificity has been given a targeted design. This paper gives a valuable reference for vehicle overload detection station design.

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Design of an Active Luminous Traffic Safety Facility Powered by Solar Energy

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ABSTRACT
To ease the safety problem of pedestrian crossing, a “PAY ATTENTION TO PEDESTRIANS (PATA)” sign powered by solar energy was assembled and installed at the crosswalk in the entrance. The PATA design included integral structure design and calculation of specific parameters
of components, and its effect was studied with the aid of velocity radar and video monitoring study. Results showed that the PATA sign could reduce average speed of vehicles when no pedestrian passes through the crosswalk, and could decrease scrambling behaviors of the vehicle drivers through the crosswalk when pedestrian passes through the crosswalk. In conclusion, PATA sign can reduce the risk of traffic accidents related to coexistence of people and vehicles at the crosswalk.

**Keywords:** solar energy, active luminous traffic safety facilities, pedestrian safety, design
城乡结合部一级公路接入口设计

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摘 要: 城乡结合部一级公路接入口是交通事故的重灾区, 因此如何合理的设计接入口成为一级公路安全、高速运营的重要环节。文章针对国内外关于城乡结合部一级公路接入口设计研究的内容, 提出了城乡结合部一级公路接入口基本设计思想, 结合现有接入口的形式, 提出新的接入口形式, 并结合娄双公路接入口设计项目, 对其中典型的接入口形式进行设计说明。

关键字: 城乡结合部; 接入口设计; 一级公路

中图分类号: U491 文献标识码: A

Design Method of Access in Joint of Urban and Rural First-grade Highway

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Abstract: The first-grade highway access of the urban-rural fringe area is serious disasters zone of traffic accidents. It is an important part for its safety and high-speed operation to consider how to design the access reasonably. Based on the main content of the research in the first class highway access of the urban-rural fringe area, this paper will come up with the basic design idea. The new form of the access will be put forward in the paper, linked to the existing ones. Besides, by combining with the access design projects of Loushuang highway, several typical access design will be explained in the paper.

Key words: Urban-rural fringe; Access design; First-grade highway

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Research on Planning of Dendritic Network Based on the Environment Suitable for Living

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Abstract

For a long time, the traffic field has a great bias on the dendritic network. The public is basically convinced that it was only suitable for motor vehicle traffic in low-density residential areas, and not suitable for China's national conditions. So such network hasn't been used in the planning. Based on the construction of livable city and public transit-based metropolis, this paper analyzes the advantages and the scope of application of dendritic network, summarizes the reasonable gradation of dendritic network. This paper also deduces the urban bus line and station arrangement of dendritic network structure from the angle of reasonable layout of public transportation, at last, analyzes the accessibility of dendritic network, and explains the possibility of the application of dendritic network to livable city and public transit-based metropolis in the future.

Keywords: dendritic network; adaptability of transit; accessibility
路基工程施工质量控制研究

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摘 要：路基是公路工程的重要组成部分，路基质量的好坏，直接影响到路面的使用性能。路面的损坏往往与路基排水不畅、质量不够、整体强度偏低等有直接关系，而且路基破坏后，修复难度大、工程费用高。因此，要求路基必须具有足够的强度、良好的水稳定性和耐久性。

关键词：路基工程; 施工; 质量控制

Abstract: the roadbed is an important part of highway engineering, the quality of the roadbed directly affects the performance of the pavement. The damage of the road surface is often directly related to the poor drainage of roadbed, poor quality and low overall strength, and it is difficult to repair, and the cost is high. Therefore, it is necessary to have sufficient strength, good water stability and durability.

Keywords: subgrade engineering; construction; quality control

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Design of the Height of Anti-Glare Panels along Concave Vertical Curves

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ABSTRACT

Objective: This study introduces a method for calculating the height of anti-glare panels for concave vertical curves to effectively reduce the effect of glare on a freeway along a concave vertical curve and to ensure driving safety and comfort.

Methods: The concave vertical curve is divided into a straight-slope section, transition section and middle section to maintain the visual comfort of drivers by limiting the height difference of the anti-glare panels. The height of the anti-glare panels in the middle section is designed based on the glare distance. In the transition section, the transition design is carried out on the height difference of the anti-glare panels using the UC-Win/Road simulation software to determine the acceptable height difference for drivers. The height in the straight-slope section is designed based on the height calculation formula given by the Chinese standard.

Results: When the glare distance is 120 m, the height of the anti-glare panels is 1.67 m for the straight-slope section of a concave vertical curve on a freeway. The height of the anti-glare panels increases in the middle section with decreasing radius, and the highest value is 2.47 m. There should be a gradual transition in the height difference of the anti-glare panels in the transition section, and the height difference should not exceed 6 cm.

Conclusions: The height of anti-glare panels differs for a concave vertical curve and a straight road, and this difference is determined by the radius of the concave vertical curve. The height gradient of the anti-glare panels in the transition section must be designed to ensure visual continuity and comfort for drivers.

KEYWORDS: concave vertical curve; middle section; transition section; the height of anti-glare panels; driving simulation
交叉口指路交通标志直行信息布局研究

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摘 要：针对现有国家标准中存在指路标志直行信息布局不合理的问题，本研究利用E-prime软件测定60位驾驶员对24块指路标志的视认反应时间及操作正确率等数据，结合调查问卷，通过独立样本t检验分析对比学习标志对驾驶人视认情况的影响，用Means过程分析个体因素的差异，提出符合视认规律的指路标志直行信息最优布局。采用单因素方差分析法多项对比分析，对32块地点距离标志与指路标志进行了组合验证。结果表明，指路标志直行信息布局应按照信息由近到远的顺序由下至上排列，驾驶人预先学习阅读相关标准可大幅提高视认交叉口指路标志的正确率。本文的成果为国标的修订提供了技术储备，对于设计更符合视认特征的交叉口指路标志有重要价值。

关键词：交叉口指路标志；信息布局；视认模拟实验

Research of Straight Information Layout in the Intersections Destination Signs

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Abstract: In order to solve the problem of unreasonable layout of destination signs in existing national standards, this study uses E-prime software and questionnaires to determine the reaction time and accuracy of operation of 24 destination signs by 60 drivers. Independent-sample T-test analysis is used to compare the different affection on drivers' visibility in learning signs. Means process is used to analyze the differences of individual factors and the optimal layout of guide signs alignment information was proposed. Compositional verification is used for the 32 directional signs and destination signs, the results indicate that the straight information layout in directional sign should be
in accordance with the information order from close to far with the bottom arrangement, drivers learn to read in advance the relevant standards can significantly improve the accuracy of the visibility of the intersection guide signs. This paper provides a technical reserve for the revision of Chinese national standard to design guide signs in intersections, which is important for designing the proper layout with better visual characteristics.

**Keywords:** Intersection destination sign; information layout; visual recognition simulation experiment

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轨道交通车站导向标识布设规律与实证研究

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摘 要：城市轨道交通系统导向标识是轨道交通建设和组织管理的关键组成部分之一，完善的导向标识系统能减少乘客的走行时间，使得出行高效快速，从而提升城市轨道交通车站的运营效率。本文总结了城市轨道交通系统功能区布设及相应的导向标识类型，阐述了地铁站换乘和进出行人流线。在此基础上，展开海淀黄庄的寻路实验，梳理了寻路过程中行人流线和行人导向标识的设置规律。结合寻路实验结果，阐述了行人导向标识设置位置、时间、路径等相关问题。导向标识布设不仅有助于提高轨道交通车站营运组织效率，也有利于合理疏散客流。

关键词：轨道交通；导向标识；寻路实验；行人流线

Research on Signage Systems Design and Empirical of Rail Transit Station Based on Way-finding Method

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Abstract: Pedestrian orientation of urban rail transit system is one of the key components of construction and organization management. Perfect signage system can reduce travel time that passengers spend at the station, to make the passengers efficiently complete the trip, as a result improving the operation efficiency of urban rail transit station. The Function Design and corresponding Signage Systems on urban rail transit system are proposed in this paper. Then, the passenger travel line of transfer or in and out can be obtained. Moreover, way-finding experiment in Hai Dian Huang Zhuang station is performed. The passenger travel line and the rule of signature system design can
be established. Finally, the location of pedestrian orientation setting, time, way analysis and other related problems will be analysis. It can be shown that the signature system can not only improve the efficiency of operating organization of rail transit station but also can be helpful to the passenger evacuation.

Keywords: rail transit station; guidance-orientated; way-finding experiment; passenger flow line

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Benefit Analysis of Railway Transportation System Construction in Yong Mei Harmonious Mining Area District

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ABSTRACT
The situation in the mining area railway is complex with many problems existing. The construction of harmonious railway system of Henan Yong Mei Coal Rail Transport Department effectively solved the problems such as resource utilization, inadequate capacity. This paper analyzes the benefits of the railway system after the improvement in various levels, such as transportation environment, monitoring system, method innovation. And make analysis of comprehensive economic benefits after the project to was carried out. This paper makes a comprehensive analysis of the benefits by construction of the railway transportation system Henan Coal Group acquired from many aspects.

KEYWORDS: Harmonious; Mining railway; System construction; Benefit analysis;
面向边界控制的路网小区划分

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摘要：在城市路网中，将较为拥挤的子路网从整个路网提取出来，通过边界控制调节拥堵区域的出入流，缓解拥堵区域的拥挤程度，是解决城市交通大范围拥堵的一个有效途径。作为边界控制的对象小区，具有紧邻型的宏观基本图（MFD）是必备前提。本文首先利用NormalNcut法将路网分割成一定数量的子路网，然后建立了在动态合并中寻找具有最优拟合度的MFD子区的数学模型。接着对模型进行分析，提出了求解模型的贪婪算法。最后以美国爱达荷州(1daho)博伊西(Boise) 市中心区的路网为研究对象，分析对比了该路网分别在Ji的方法和本文方法划分下的区别，发现该方法在寻找最优MFD拟合度小区的同时也可以优化子区的密度均匀度。

关键词：交通拥挤 边界控制 宏观基本图 小区划分 贪婪算法

The Spatial Partitioning of Traffic Networks for Boundary Flow Control

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Abstract：It is an effective way for alleviating traffic congestion to use boundary flow control strategy to the extracted sub-network with the higher congestion degree in traffic network. As an objective sub-network in boundary flow controlling, it is essential prerequisite that having compact MFD. Based on the initialization areas partitioned by NormalNcut algorithm, the math model to find an optimal fitting
degree sub-network in dynamic merge process is built in this paper. Then, after analysis of the model, the greedy algorithm to solve this model is proposed. Finally, the method is applied to the network of downtown of Idaho in Boise. After analyzing the application and compared the method and Ji’s method, we find the method have a reasonable result, in addition, the network can be divided more evenly when the optimal solution is achieved.

**Keywords:** Traffic Congestion, Boundary Flow Control, Macroscopic Fundamental Diagram, Division of Sub-regions, Greedy Algorithm
基于5.8GHz DSRC和车牌识别的路径识别标识点建设方案研究

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摘 要: 随着高速公路的不断发展，路网规模日益扩大，多义性问题逐渐成为高速公路路网建设的关注重点。2015年交通运输部发布《收费公路联网收费多义性路径识别技术要求》，为全国各省份高速公路路径识别系统建设的关键技术进行了规范化要求。本文结合内蒙自治区高速公路路径识别系统建设，对基于5.8GHz DSRC（专用短程通信技术）和高清车牌识别技术的标识点建设方案进行了探讨。

关键词: 高速公路; 路径识别; 5.8GHz标识点

Research on the Construction Scheme of Path Identification Station Based on 5.8GHz DSRC and License Plate Recognition

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Abstract: With the development of highway and the constant expansion of road network, multi-path problem has become the focus of highway network construction. In 2015, the Ministry of Transport of the PRC released “the Technical Requirement of Ambiguous Path Identification of Road Network Toll Collection” which normalized the key technologies of the construction of highway path identification system in every province across the country. This paper discusses the construction scheme of path identification station based on 5.8GHz DSRC (Dedicated Short Range Communications) and HD license plate recognition with the combination of path identification system construction on the highway of Inner Mongolia Autonomous Region.

keywords: highway; path identification; 5.8GHz identification station
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高速公路全程监控供电设计方案研究

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摘 要：根据工程经验对高速公路全程监控供电特点进行了分析，比较分析了传统低压供电、太阳能供电与中压供电的优缺点，对中压供电在全程监控供电中的应用做了介绍和经济比较，为高速公路全程监控提供一种较为可靠、经济的供电参考方案。

关键词：高速公路；全程监控；长距离供电

Research on the Design of Power Supply for the Entire Monitoring of Expressway

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Abstract: According to engineering experience, the characteristics of power supply for the entire monitoring of expressway is analyzed, and the advantage and disadvantage is compared among traditional low voltage power supply, solar power supply and medium voltage power supply, and then the application of medium voltage power supply in the entire monitoring of expressway is introduced and its economic analysis is made. This paper offers a reference of reliable and economic way of power supply for the entire monitoring of expressway.

keywords: expressway; the entire monitoring; long distance power supply

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大数据在交通规划和管理中实践探索——以广州为例

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摘 要：伴随着大数据、云计算、互联网、人工智能等新型技术的发展，促进交通大数据的研究和应用成为焦点，大数据被逐步辅助运用到交通规划、政策制定、行业监管等多个方面。然而，大数据条件下的交通系统分析不是将大数据技术简单套用或者移植到交通领域，而是将大数据技术融入到交通体系中，将数据挖掘成为有效信息，从价值信息中提炼特征，从特征变化中发现规律，从特征规律中提出措施。首先，梳理大数据的特征、发展阶段以及交通大数据三大类别；其次，分析手机数据、IC卡数据、GPS数据和道路卡口数据的基本原理和应用领域，以广州市为例进行实证研究，并从单类数据深入挖掘、数据质量评估和验证以及多元数据融合等提出研究三点展望，为下一步城市交通大数据的应用提供参考。

关键词：大数据；手机数据；IC卡数据；GPS数据；道路卡口数据；广州

Exploration of Big Data in Transportation Planning and Management: Guangzhou as an Example

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Abstract: In recent years, with the development of new technology of big data, cloud computing, the internet artificial intelligence, etc... Big data research and application has been become the focus. Big data has been applied gradually to traffic planning, policy development and industry management. However, traffic system analysis is not a simple application or transplantation by large data technology, but the big data technology was integrated transportation system. Meanwhile, the big data was excavated accurate information, and the information was refined some features to discover the law. Firstly, the characteristics and development stage of big data and categories in the transport sector were
combed. Secondly, Basic principles and application areas of mobile phone data, IC card data, GPS data and road bayonet data were analyzed. Finally, some cases of Guangzhou city were analyzed, and three research perspectives are proposed from single-class data mining, data quality assessment and validation, and multivariate data fusion, the purpose is to provide a reference for the application of urban traffic big data.

**Keywords:** big data; mobile phone data; IC card data; GPS data; road bayonet data; Guangzhou

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基于有机更新的老城区道路及其沿线开放空间功能提升策略研究——以上海市北外滩核心区为例

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摘 要：城市有机更新主要是对老城区不适应城市发展理念的地区作必要的改建，主要包括道路及其沿线开放空间。通过提升老城区道路及其沿线开放空间功能，使老城区重现生机和繁荣。本文以上海市北外滩核心区为例，对老城区道路及其沿线开放空间功能提升过程中所需考虑的问题和因素作了初步研究，并探究性地提出了基于有机更新的老城区道路及其沿线开放空间功能提升策略。

关键词：城市更新；道路；开放空间；功能提升

Research on the Strategy of Improving the Functions of Roads and Open Space in the History Areas Based on Urban Regeneration: A Case Study of Shanghai

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ABSTRACT: The purpose of urban regeneration is to rebuild the old urban areas where do not meet the urban development mainly involves promote the functions of the roads and open space along them. In this way, the history districts in town will be back to vitality and prosperity. The paper takes the case of Shanghai North Bund core area, focusing on the issues and motivations in the improving process then exploring some strategies base on this topic.

Keywords: Urban regeneration; Roads; Open space; Functions promotion

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基于指数函数非线性反馈的船舶航向保持控制

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摘要：为研究船舶航向保持控制问题，本文以“育鹏”轮为研究对象，建立了其非线性Nomoto船舶运动模型，设计了基于闭环增益成形算法的指数函数非线性反馈控制器，并以“育鹏”轮的非线性模型为被控对象，用Matlab进行系统仿真研究。系统仿真结果表明，建立的非线性Nomoto数学模型精度良好，设计的控制器在进行船舶航向保持控制时效果优异，并且更节能。使用这种方法设计的控制器，可以很好地进行船舶航向保持控制，对今后的船舶运动仿真和控制器的设计具有重要意义。

关键字：船舶; 航向保持; 指数函数非线性反馈; 闭环增益成形

Ship Course Keeping Control Based on Nonlinear Feedback of Exponential Function

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Abstract: In order to research the problem of course keeping control of ship, "Yu Peng" ship is treated as the research object in this paper, we established the nonlinear Nomoto ship model, and designed an exponential function nonlinear feedback controller based on closed loop gain shaping algorithm. We take the nonlinear model of Yu Peng as a control object, and carried out the simulation by using Matlab. The simulation results show that the nonlinear Nomoto model has good accuracy, the designed controller has good performance, and it is more efficient. Using this method to design the controller, which can not only carry on the ship course keeping control well, but also has the important significance to the future ship motion simulation and the design of the controller.

Keywords: ship; course keeping; nonlinear feedback of exponential function; closed loop gain shaping
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基于交通流预测的城市单交叉口控制方法

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摘 要：提高城市交叉口的信号控制效果对缓解城市交通拥堵具有重要意义，基于此，以城市单交叉口为研究对象，统筹考虑城市交通流实时变化和非线性的特性，以GA优化的RBF神经网络作为城市道路交通流预测模型，提出一种基于交通流预测的城市单交叉口实时控制方法。首先，应用交通流预测模型以15 min为周期预测交叉口各进口道的交通量，由交通量预测值计算各相位的交通延误，以交通延误最小为目标确定通行相位；然后，计算最佳信号周期，以交叉口总排队长度最小为目标建立控制函数，求解函数以确定各相位的最佳绿灯时间；同时对当前15 min内信号周期和各相位的绿灯时间进行调整。最后，以某单交叉口为实例来验证该预测控制方法，其结果表明：提出的预测控制方法能有效降低交叉口处的排队长度和交通延误，能满足缓解城市道路交通拥堵问题的客观需求。

关键词：单交叉口；交通流；预测控制方法；RBF神经网络；遗传算法

中图分类号：U491.1

Control Method of Urban Single Intersection Based on Traffic Flow Prediction

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Abstract: Improving the effect of urban intersection signal control is of great significance to alleviate urban traffic congestion problems, based on this, the urban single intersection is taken as the research object, considering the nonlinear character of urban traffic flow, the optimized RBF neural network by GA is taking as the urban traffic flow prediction model, a control method of urban single intersection based on traffic flow prediction. The prediction model with an interval 15 min is applied to forecast
the import direction traffic flow of intersection, then the traffic delay of each phase is calculated by
the prediction, to determine the next pass phase by minimum traffic delay; to calculate the optimal
signal period and to establish the control function with the target of minimizing the intersection total
vehicle queue length, to determine optimal green time of each phase by solving the function; moreover,
the signal cycle and green time of each phase within the current 15 min were tuned. Finally, a single
intersection is taken as an example to verify the predictive control method, the results demonstrate that
the predictive control method can reduce the intersection of queue length and traffic delays and also
meet the objective requirements of alleviating the urban road traffic congestion problems.

Keywords: single intersection; traffic flow; predictive control method; RBF neural network; genetic
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Input-Output Approach for Queue Length Modeling at Metered On-ramps

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ABSTRACT

One of the critical challenges with a ramp-metering system is the lack of up-to-date queue storage design guidance. With consideration of the unique on-ramp arrival flow pattern, this paper presented an analytical procedure for modeling the queuing process at metered on-ramps. A key methodological contribution of this method is that it can more accurately capture the impacts of platoon on-ramp arrivals released from upstream-signalized intersections on queue generation, which was usually ignored by traditional analytical methods. For each on-ramp feeding movement, the on-ramp
arrivals were divided into two regimes: the saturated platoon arrival regime and the non-platoon arrival regime. Accordingly, cycle-by-cycle queue generation profile at metered on-ramps was described, and queue length at a specific time point can be estimated based on the input-output approach. It was found that on-ramp flow arrival pattern plays a significant role in the queue generation process, and queue storage length design should be based on the maximum or a percentile queue length rather than the average queue length. Model validation results show that the proposed method could properly capture the realistic queue profile and the estimated queue lengths are close to field observations. Further considerations need to be put into the random factors that affect real-time queue length, including right-turn-on-red, violation of the ramp metering rule, queue flush strategy, and lane imbalance factor.

**KEYWORDS:** ramp metering; queue length; signalized intersection; platoon arrival
Personalized Two-layer Regional Transportation Control Model for Big Events

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Abstract

This paper proposed a personalized two-layer regional transportation control model for urban transportation control issues during big events. Firstly, this paper analyzed basic regional transportation control principles faced during big events and built a two-layer regional transportation control model that was both a personalized transportation management model and control model, which could fully reflect personalized experiences of transportation controllers. Then, based on particle swarm algorithm, this paper proposed a model optimization solution based on compression particle swarm and finally, generated a control vector of every area and intersection in each region. This paper used examples of organized big events in Changsha city to simulate and verify transportation control. The simulation results showed that during big events, regional transportation system worked well, which indicated that this model was able to effectively solve regional transportation problems during big events.

Keywords: Transportation control model; Personalization; Big events; Compression particle swarm algorithm
G320国道与城市祥云大道衔接点交通优化分析

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摘要：本文以南昌市G320国道与城市道路祥云大道衔接点为研究对象，对干线公路与城市道路的衔接现状存在的问题，提出相应疏导策略，基于Vissim仿真对疏导方案进行评价，为干线公路与城市道路的衔接畅通化设计提供方法指导和参考案例。

关键词：干线公路；城市道路；道路衔接；交通优化

G320 National Highway and City Road Linking Point of Auspicious Clouds Traffic Optimization Analysis

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Abstract: Based on the national highway and city roads in Nanchang city G320 Avenue convergence point as the research object of auspicious clouds, there are situation of highway and city road problems, put forward the corresponding strategy, Vissim simulation to evaluate the grooming scheme based on link Chang Tonghua design for highways and city roads to provide guidance and reference case method.

Keywords: trunk road; urban road; road connection; traffic optimization

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Modelling and Sensitivity Analysis of Two Adjacent Intersections with Short Left-turn Lanes and Uncoordinated Signals

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ABSTRACT
Short left-turn lanes are sometimes installed on the common road section between adjacent signalized intersections for right-hand traffic. Such short left-turn lanes may not only reduce the approach capacity but also impact on one another. Three multi-objective optimization models are developed for two adjacent intersections with short left-turn lanes and uncoordinated signals. To evaluate the operations of the two intersections as a whole, the total capacity-to-delay ratio and total delay-to-capacity ratio are defined as the performance measures. Using the field data from Dalian city of China, the sensitivity of the optimization results is emphatically analyzed to the weighting factors of the objective functions. To further clarify the impacts of different scenarios on intersection operations, four optimization scenarios are simulated together with the existing one. Based on the research results, two variations of the formulated models are recommended to apply in practice with the procedure of model application being provided.

KEYWORDS: adjacent intersections; short left-turn lanes; uncoordinated signals; optimization
Optimization of Signalized Intersection Based on VISSIM Simulation Software

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ABSTRACT:

Intersections are the control points of orderly organization of various transports, so it is crucial to optimize and improve the capacity of intersections. Firstly, the traffic simulation software VISSIM is used to simulate the optimization of signal-controlled intersection. According to the actual situation of Chinese urban roads, the calibration parameters of the core model of the VISSIM are calibrated by using the Latin orthogonal test method in order to get more accurate simulation results. Secondly, the paper studies the optimization of signal-controlled intersection. The article establishes a signal cycle optimization model with the target of minimizing the delay of saturated intersection. Finally, a case study of Tianyaoqiao road intersection in Shanghai stadium is carried out. The VISSIM software is
used to simulate the optimization measures of the intersection. And according to the output evaluation results, we can verify the effectiveness of traffic organization optimization measures.

**KEYWORDS:** traffic simulation, optimization of intersection, parametric calibration
基于元胞自动机模型的信号灯路口车辆排队长度的仿真研究

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摘要: 本文考虑公交车和信号灯对道路交通流的影响, 通过数值模拟, 研究了公交车比例、红绿灯配时与信号灯路口排队长度的关系。研究发现, 公交车比例与红绿灯配时对信号灯路口排队长度的影响分为两个阶段: 当红灯时长低于某一阈值时, 路口排队长度较小且随公交车比例和红灯时长的变化平缓; 当红灯时长超过这一阈值, 排队长度产生一个跃升, 随着红灯时长的继续增加, 排队长度随公交车比例和红灯时长的变化速度加快。

关键词: 元胞自动机, 交通流, 排队长度, 公交车比例, 红绿灯配时

Simulation Research on the Queue Length at Signalized Intersections Based on Cellular Automata Model

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Abstract: This article investigates by numerical simulation the relationship between queue length at signalized intersections and the proportion of bus in the traffic as well as the traffic signal timing. It is found that the impact of the proportion of bus and the traffic signal timing on the queue length can be divided into two phases: when the duration of red light is smaller than a certain critical value, the queue length is small and it varies slightly with the proportion of bus and the duration of red light; when the duration of red light reaches the critical value, an abrupt increase of queue length is observed and as the duration of red light continues to increase, the queue length varies more rapidly with the proportion of bus and the duration of red light.
Keywords: cellular automata, traffic flow, queue length, proportion of bus, traffic signal timing

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行政办公单位停车特性及泊位共享时空窗口划分方法

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摘要：为了提升城市既有停车设施资源的利用效率，以行政办公配建停车场为研究对象，调查分析了泊位使用量的日变和周变特性，结果表明：停车场泊位使用量的变化特性存在规律性、稳定性、明显峰谷时段的特征，具有停车共享的可行性。提出了泊位共享时空窗口概念及划分方法，明确了开放时长、维持最大开放泊位数目开放时长、共享泊位数目等共享时空窗口划分约束条件，给出了具体划分步骤。选择南京市交管局停车场为实例，对划分方法进行应用。研究结果表明：运用泊位共享时空窗口的划分方法可进行有效的泊位共享时空窗口划分，共享时段可布置在11:30-14:00之间的停车需求曲线的波谷段；公务用车折减系数影响共享泊位窗口划分结果，选取的折减系数越小影响共享窗口的泊位供给规模就越小，可通过调节的大小进行共享窗口划分结果的调整。

关键词：行政办公单位；工作日停车特性；泊位共享时空窗口；划分方法

Parking Characteristics of Administrative Unit and Partitioning Method of Berths Shared Space-time Windows

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Abstract: In order to improve the utilization efficiency of existing parking facilities resources in the city, the parking lots of administrative unit were investigated where the daily and weekly variations characteristics of berths usage were studied. The results showed that there were regularity, stability and obviously peak-valley period in variations characteristics of the parking berths usage. Therefore
parking sharing was feasibility in administrative unit. The concept and partitioning method of berths shared space-time windows were proposed. The constraint conditions including opening hours, opening hours of maintaining the maximum number of open berths, the number of shared berths and so on were defined. And the detailed steps were given. The parking lot of Nanjing Traffic Management Bureau was chosen as an example to test and verify the partitioning method. The results showed that this method can be used to partition berths shared space-time windows effectively and the sharing period can be located in the trough section of the parking demand curve during 11:30-14:00. The reduction coefficient of official car (\(\varpartial\)) affects the window partition results of shared berths. The \(\varpartial\) is smaller, the smaller the shared windows berth supply scale can be. The partition results of the shared windows can be adjusted by adjusting the size of \(\varpartial\).

**Keywords:** administrative unit; parking characteristics; berths shared space-time windows; partitioning method

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考虑侧向交通量的城市干线信号协调方法

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摘 要：考虑非高峰时期车辆在交叉口不能超车且车流量较低等条件，假设侧向交通量车头时距服从移位负指数分布，研究在半感应控制下交叉口主线绿信比与侧向交通量的数学关系及其适用范围，将停车次数作为干线协调方案的决策指标，建立了基于侧向交通量的干线协调概率决策模型。最后，采集三个实际交叉口的交通量数据和基本信号设置参数，采用期望停车次数概率得出了干线协调方案运行时段，并对协调交叉口的数量这一关键参数进行了灵敏度分析。结果表明，基于本文提出的模型能够为动态信号协调方案提供一定的依据，对于提升城市交通信号控制效率有一定的意义。

关键词：交通量；绿信比；信号协调；停车次数；概率

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Signal Coordination Method of Urban Trunk Considering Lateral Traffic Volume

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Abstract: Signal coordination is a beneficial strategy for improving arterial traffic efficiency and safety. Previous research on the criteria for establishing signal coordination plans has been focused on more objective factors such as intersection distance, arterial traffic volume and platoon dispersion. Based on the condition that vehicles cannot overtake at the intersection and traffic volume is at a relatively low level during off-peak hours, side-street vehicle time headway is considered to follows Cowan’s M2 distribution. A mathematical relationship between arterial green time ratio and side-street traffic volume
and its scope of application are developed at semi-actuated intersections. A probabilistic model for signal coordination decisions is proposed based on side-street traffic volume, which takes the number of stops as the decisive indicator. In the end, based on the traffic volume and the basic signal timing parameters of three real intersections, recommended time periods to run signal coordination plan are calculated through the expected number of stops. The sensitivity analysis of intersection numbers, which is a key parameter, is carried out. The results show that the proposed model can provide some guidelines for dynamic signal coordination plans. It is significant to urban traffic signal control.

**Keywords:** traffic volume; split; signal coordination; number of stops; probability

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基于间隙接受理论的环形交叉口通行能力方法综述

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摘要：现代环形交叉口服从入口让行规则，只有当环行车流出现大于某一临界间隙时，入口车辆才能进入，否则就必须等待。其入口通行能力可以利用间隙接受理论进行分析，从两股车流相互作用时的排队模型中推导出来。论文介绍了车头时距分布的主要形式：拥挤指数分布（即M3分布）及其自由流比例的确定方法，并指出负指数分布和移位负指数分布都是M3分布的特殊形式。环形交叉口的入口通行能力模型可以根据进车函数为分段函数和连续函数的不同，以及临界间隙取值为常数和随机函数的不同进行分类。论文给出了每种类型通行能力计算的典型公式，结论指出各类型能力公式的计算结果相差较小，而基于临界间隙为随机函数的通行能力公式更符合实际，其计算公式也更为复杂。论文最后给出了现代环形交叉口通行能力研究存在的问题及进一步研究方向。

关键词：现代环形交叉口；通行能力；间隙接受；车头时距；临界间隙

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Research Summary on Capacity at Roundabouts Based on Gap Acceptance Theory

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Abstract: The traffic stream of entry vehicles has a priority at modern roundabouts. Entry vehicles can enter roundabout when there is a time gap larger than the critical gap in circular vehicles stream, otherwise the vehicles need to wait until enough large gap. The gap acceptance theory can be used to analyze the entry capacity at roundabouts. The capacity model can be derived by queuing theory
involving two vehicle streams. The paper introduced a main style of headway distribution, which is named as bunched exponential distribution or M3 distribution. The calculation model of free stream ratio is also introduced. It is known that the negative exponential distribution and shifted negative exponential distribution are special M3 distributions. The entry capacity models based on queuing theory at roundabouts can be classified by different entry vehicle types of piece-wise function or linear function, or by different critical gap types of constant or stochastic function. For each kind of capacity expression, the typical capacity expressions are given. The calculation values show less difference to two kinds of models. The capacity value based on the critical gap of stochastic function is more realistic and more complex in function style. Finally the paper pointed out some problems and the further research directions in capacity of roundabouts.

**Keywords:** Modern Roundabout; Capacity; Gap Acceptance; Headway; Critical Gap

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Traffic Control Sub-region Division Method Based on Traffic States
Analysis of Intersections

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ABSTRACT

The combination relevance of intersections is the direct basis for the division of sub-regions. However, there are little research on this problem. In this paper, with the definition and modelling on the correlation degree, the method of two stage sub-region division is designed. Firstly, according to the signal cycle similarity, the method for preliminary classification of intersections is given, in order to reduce the calculation complexity of sub-region division; secondly, according to the traffic transmission characteristics, the combination relevance degree model of intersections is established. Finally, a numerical example in Ningbo is given to verify the feasibility of the method.

KEYWORDS: Traffic control, Sub-region division, Combination relevance, Similarity.
Bi-level Programming Model and Improving Search Algorithm Based on Punishment Plane for Facility Layout Program of Railway Passenger Hub Station and Flow Optimization Simulation

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ABSTRACT

The pros and cons of the facility layout programme of the hub station would directly affect the walking
efficiency of passengers and the cost of hub construction, thus, the bi-level programming model, maintaining passengers in the hub station walking in the more efficient route and achieving the total cost of the hub construction to the minimum, are presented. Upper level contains three objective models, and the lower level is the non-linear objective model with linear constraints. In order to solve the presented bi-level programming model, improving search algorithm based on punishment plane for solving upper level model is proposed; the dominated solutions of the upper level model are the constraints for the lower level model, and optimization solver, CPLEX, is the tool to solve the lower level model. In order to validate the optimization solutions, Lanzhou West Station is constructed as the simulation model which is revealed on MASSMOTION, and the simulation results are in highly consistent with the optimization solutions. The way of solving problem correctly and reasonably would provide facility layout programme in the hub station with an innovated direction, which would support a scientific basis on the work in hub station.

**KEYWORDS:** facility layout programme; passenger flow; bi-level programming model; Pareto frontier; CPLEX; Lanzhou West Station
Evaluation of Bandwidth-based and Delay-based Timing Optimization Approaches

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ABSTRACT

Delay-based Optimization and Bandwidth-based Optimization are often discussed during signal coordination. Delay-based Optimization focuses on minimizing the system-wide delay which indicates the method would decreasing the delay from all approaches. The Bandwidth-based Optimization aims to save the time for particular approaches which would be implemented in an arterial. In previous
research, there have continued debate which method is better over the other. This paper, devoted to making a comparison towards the two methods. VISSIM was employed in this research used to validate the results output. Five scenarios were designed to represent different volume conditions. For each scenario, both the intersection performance and the arterial performance would be analyzed. The study results illustrated that the Bandwidth-based optimization performed better than the Delay-based Optimization in most cases.

**Keywords:** Signal Coordination; Performance Evaluations; Delay-based optimization; Bandwidth-based optimization
考虑多节点拥堵的城市道路网级联失效仿真

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摘 要：为了量化城市路网在多个节点突发拥堵时出现的级联失效现象，首先采用原始法构建路网的几何拓扑图，依次从拓扑图中删除拥堵节点，然后利用连通度、最大连通子图相对大小与圈数率3个鲁棒性评价指标衡量路网通行效率，计算出通行效率不低于10%条件下的最大节点失效比例，再运用双层网络配流模型测算级联失效时的路网拥堵度，最后通过Transcad 4.5和matlab 2012a完成对包含54个节点，92条路段的成都市某地中等规模路网的仿真实验。实验结果表明：仿真路网在最不利条件下的最大节点失效比例为19.3%；相比于单个拥堵节点，2个以上节点同时拥堵更易造成路网出现级联失效现象；当拥堵节点数目达到一定数量后，拥堵度逐渐趋于稳定并使路网到达其鲁棒性的极限。该研究旨在为突发条件下的路网管控措施提供技术参考。

关键词：交通工程；级联失效；堵塞度测算；多节点拥堵；路网仿真

中图分类号：U491.1

Cascading Failure Simulation of Urban Road Network Considering Multi-node Congestion

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Abstract: In order to quantify cascade failure phenomenon of urban road network under condition of multiple nodes being sudden congestion, the geometric topology of network is completed by primitive method, and removing congestion nodes in turn from topology to measure traffic efficiency of road network by 3 evaluation robustness index: the connectivity, the relative size of maximum connected subgraph and circle rate, and calculating the maximum failure node ratio whose traffic efficiency is no less than 10%. What’s more, working out congestion degree of road network in multi-node failure by
using the double-layer network assignment model, and finally using Transcad 4.5 and matlab 2012a to get a medium-sized road network which owns 54 codes and 92 links in Chengdu calculate and simulate. The simulation results show that: in the most unfavorable conditions, the network’s maximum failure node ratio is 19.3%; the cascade failure caused by 2 more nodes' concurrent congestion will have more significant effect on road network capacity than the single node failure; and the congestion level of whole network tends will be stable when node failure surpasses a certain number, and gradually reaches the limit of network’s robustness. The study is aimed at providing technical reference for control measures under sudden condition on road network.

**keywords:** traffic engineering; cascading failure; congestion degree measure; multi-nodes failure; network simulation

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基于工况分析的城市轨道列车自动行车系统多目标优化策略

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摘要：传统的自动行车系统（ATO）具有良好的自动行车能力。但系统通常为达到行驶目的，通常会进行频繁地工况转换，从而导致浪费能源并使乘客舒适度下降。本文将对能耗和舒适度这两个参数进行目标优化。并在前人的研究基础上，提出以工况为基础的分段分析建模优化参数的ATO多目标优化策略。利用改进的遗传算法进行模型求解。最后整合各段优化得出的运行曲线，得到完整的运行曲线图。通过实例仿真，该方法具有很好的优化效果及可操作性。

关键词：ATO; 优化; 工况

中图法分类号:U231+.6; 文献标志码  A

The Multi-objective Optimization Strategy of Urban Railway Train Automatic Operation System Based on Working Condition

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Abstract:Traditional automatic train operation (ATO) system has a good ability of automatic driving. But to achieve driving purpose, the system will change working conditions frequently. So it make passengers feel uncomfortable and waste energy consumption. This paper will optimize parameter of driving comfortable and energy consumption and propose a optimization strategy of ATO which base on working condition and establish the model on each condition. The model is solved by genetic algorithm which has been developed. Finally, each speed curve are combined to finished ATO multi-objective optimization speed curve. Through the example simulation, the method has a good optimization effect and maneuverability.

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Keywords: ATO; optimize; working condition

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基于多元线性回归交织区通行能力模型

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摘要：为了简化高速公路交织区通行能力计算和服务水平评价，针对我国《公路通行能力手册》关于交织区通行能力值在应用过程中需要通过迭代计算或线性插值粗略估计等问题。首先本文对手册中交织区的几何特征重新定义，包括交织区长度、宽度和结构；在此基础上，对手册中交织区理想通行能力值表格（表4-1）进行多元线性回归分析，建立交织区单车道通行能力与交织区相同自由流速度下基本路段通行能力、交织流量比、交织区长度和交织车道数的通行能力线性回归模型，并通过拟合优度检验、F检验、t检验和多重共线性检验；然后以西安绕城高速公路四处交织区为例，根据实测数据分别采用线性内插法和回归模型计算通行能力，验证了回归模型的有效性和实用性。研究结果表明：高速公路交织区通行能力多元线性回归模型具有较高的适用性和精度，从而使得在一定路段或缺乏交通流数据的条件下，能够估算交织区通行能力值，为高速公路交织区设计和运营阶段通行能力分析和服务水平评价提供了依据。

关键词：交通工程; 交织区通行能力; 多元线性回归; 最小二乘估计; 显著性检验; 多重共线性

中图分类号: U491.1+22

Based on Multivariable Linear Regression of Weaving Segments Capacity Model

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Abstract: In order to simplify the highway weaving segment capacity calculation and the service level evaluation, the problem such as the application of weaving capacity value need to be iterative calculated or linear interpolated at a rough estimate and so on were studied in this paper. Firstly, the
geometric characteristics of the weaving segment in the manual was redefined included the length, width, structure and so on. Secondly, a linear regression model for the single lane traffic capacity of weaving segment, capacity of a basic freeway segment with the same free-flow speed as the weaving segment, volume ratio, length of a weaving segment and capacity of number of lanes within the weaving section was established by the multiple linear regression analysis of the idea weaving segments capacity value form (table 4-1), and through the test of goodness of fit, F-test t-test and multicollinearity test. Then taking the four Expressway Weaving Segments around Xi’an as an example, the capacity was calculated by the linear interpolation method and regression model according to the measured data to verify the validity and practicability of the regression model. Research results showed that the highway weaving segment capacity multivariate linear regression model has high applicability and accuracy, which could be used to estimate the weaving segment capacity value in a certain section or under the condition of lack of traffic flow data. This research could provide the basis for the analysis of traffic capacity and service level evaluation of the weaving segment.

**Keywords:** Traffic Engineering; Weaving Segments Capacity; Multivariable Linear Regression; Least Squares Estimation; Significance Test; Multicollinearity

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A Delay Model of Signalized Roundabouts

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ABSTRACT

In order to evaluate the LOS of roundabouts intuitively, a new delay model of signalized roundabouts was established. Vehicle delays on roundabouts were divided into two parts according to traffic flow characteristics in the signalized roundabout: entrance delay and circulating lane delay. Entrance delay was calculated using the delay model in HCM2010. Circulating lane delay was studied by analyzing conflict behavior in signalized roundabouts, and delay models of traffic flows turning in different directions were established based on the Motorcade Analysis Method. Finally, simulation software, calibrated using field data, was used to verify the model. The simulation results show that the average relative error of the model is 10.1%, meeting the accuracy requirements. Therefore, the delay model properly reflects the operation efficiency of a roundabout, and can thus provide a scientific basis for a control scheme.

Keywords: Roundabout; Signal control; Delay; Motorcade Analysis Method
ABSTRACT

Due to the current parking facilities configuration ignoring the parking demand characteristics among different types of buildings, the contradiction of parking supply and demand requirement is aggravated. With the urban complex as research object, the paper analyses that the parking peak hours of different types of buildings in urban complex are complementary, and the imbalance is serious between parking supply and demand based on the parking survey data in Harbin. The main affecting factors of urban complex parking demand are analysed, and the modification factor of the urban complex parking generation rate model is built under the single factor combined with the actual parking demand. Based on the parking sharing, the paper establishes the parking demand forecasting model of
urban complex under multiple factors by regression analysis, and takes Yuguang-Intel Industrial Park in Harbin as an example, to verify the validity of the model. The results show that the predicting value of parking demand by the model is closer to the actual parking demand, which can effectively avoid the imbalance between supply and demand of parking facilities, and improve the utilization efficiency of parking facilities.

**KEYWORDS:** traffic engineering; parking demand forecasting; regression analysis; urban complex; parking sharing
信号控制交叉口交通流宏观基本图

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摘 要：为了揭示宏观层面上交通流运行特性，利用交通波方法对交叉口宏观基本图进行了研究。首先将路段整体的供需状态分为三种：未饱和状态、完全堵塞状态和过渡状态。针对这三种状态建立了相应的宏观基本图，研究结果显示，对于信号控制路段而言，平均流量首先随着平均车辆数增加而增加，达到临界饱和时流出流量达到最大值，完全堵塞状态下流出流量随平均车辆数线性递减，交叉口的宏观基本图和路段宏观基本图具有相似的形式，且斜率随着交通状态的分布有所区别。论文研究成果为进一步探索交通流运行特性奠定了基础。

关键词：宏观基本图；交叉口信号控制；敏感性分析

Macroscopic Fundamental Diagram of Signalized Intersection Traffic Flow

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Abstract: Traffic wave method was adopted to study the relationship between average outflow and average car number in order to recover the macroscopic feature of traffic flow. The supply—demand condition was classified into three types: unsaturated condition, fully congested condition and transitional condition. Macroscopic fundamental diagrams were established respectively. The results showed that for a signal controlled road, firstly average outflow increased with average vehicle number, at critical condition average outflow reached its maximum, under fully congested condition, average outflow decreased against average vehicle number. For the whole intersection, macroscopic fundamental diagram displayed the similar profile. The slope was related with the distribution of traffic state. Research results provides basis for further exploring the dynamics of traffic flow.
Keywords: macroscopic fundamental diagram; intersection signal control; sensitivity analysis

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Adverse Weather Classification Based on the Influence of Traffic Flow Characteristics at Signalized Intersections

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ABSTRACT

Traffic flow progression at signalized intersections shows different characteristics due to the impact of adverse weather conditions. Setting specific signal control schema at different levels of adverse weather is an important way to reduce its impact on traffic. Five signalized intersections of different types and scales located at urban and suburban areas in Beijing were selected as the investigation spots in this study. The data collection time covered the adverse weather date through the months of April 2012 and February 2013, which have different intensities of rainfall or snowfall. Based on the parameter extraction, the characteristics indicators including Saturation Headway (SH), Saturation Flow Rate (SFR) and Start-up Lost Time (SLT) under different intensities of adverse weather were analyzed. The relationship models between the indicators and the precipitation of inclement weather were established by significance testing and regression modeling. Consequently, the influence of rain and snow on the traffic flow at intersections was described quantitatively. Finally, the various adverse weather conditions were classified into four categories based on its influence on the intersection traffic. The classification results show that the SFR reduced by 0-13%, 13%-30%, 30%-60% and more than 60% for the first to fourth grade of adverse weather. Similarly, the SLT at intersections approximately have 30%, 50%, 75% and 100% increases respectively. These traffic flow characteristics in every grade of adverse weather provide unified and applicable parameters for the optimization of traffic control schema under certain levels of inclement weather.

KEYWORDS: traffic flow parameters; adverse weather; signal intersection; influence model; weather classification
网联车混合交通流渐进稳定性解析方法

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摘 要：针对网联车与常规车混合交通流，建立渐进稳定性理论解析框架。从概率角度描述网联车紧跟常规
车而退化为常规车的随机现象，应用随机性仿真验证该随机退化现象数学期望表达的正确性。将混合交
通流不稳定条件转化为关于网联车市场率平方项的线性函数，进而建立渐进稳定性理论解析框架，求得不同
网联车市场率、不同平衡态速度下混合交通流渐进稳定域。研究结果表明，网联车有利于交通流稳定性的提
升，网联车市场率达到约50%时，混合交通流在任意平衡态速度下均渐进稳定。所建立的混合交通流渐进稳
定性解析框架，能够适应网联车与常规车跟驰模型选取的多样性，进而为网联车大规模实地测试的实施提供
理论参考。

关键词：交通工程；混合交通流；稳定性解析；网联车

中图分类号：U491.112

Asymptotic Stability Analysis of Traffic Flow Mixed with Connected Vehicles

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Abstract: This paper is aimed at presenting an analytical framework of asymptotic stability of traffic
flow mixed with connected vehicles and regular vehicles. From the perspective of probability, the
random phenomenon that connected vehicle would degenerate to regular vehicle if following a regular
vehicle was described. In addition, the expected expression for the degeneracy was validated using random simulation experiments. The instability condition of mixed flow was transformed into linear function with respect to quadratic term of connected vehicles market rate. Then, asymptotic stable regions were obtained under different connected vehicles market rates and equilibrium speeds. The results indicate that connected vehicles benefit traffic flow stability. Moreover, the mixed traffic flow will become stable under any equilibrium speed, if the market rate of connected vehicles reaches about 50%. The analytical framework built in this paper can be able to adapt various car-following models for both connected vehicles and regular vehicles. Therefore, it can provide theoretical reference for large-scale implementation of connected vehicles.

**keywords:** traffic engineering; mixed traffic flow; stability analysis; connected vehicles

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Parking Supply Mode and Parking Layout Optimization Model for Old Residential Areas in Urban Central Area

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ABSTRACT

Due to historical reasons, the old residential areas of metropolis are lack of necessary attached parking lots. The available space is limited. These reasons result in serious parking problems. This paper took old residential areas in urban central area as the research object. A parking supply mode was adopted, which coordinates parking resource of on-road and off-road. A parking layout optimization model was set up to relieve parking contradiction of old residential areas.

Based on the investigation of two typical old residential areas, the data of parking with time variation, parking utilization rate and the parking intention survey were analyzed. This paper concluded that parking supply mode which coordinates parking resource of on-road and off-road is more suitable for old residential areas. The use of on-side parking resource was prohibited before the morning rush hour and allowed after the evening rush hour. A parking layout optimization model coordinating parking of on-street and internal residence was set up to ensure the average walking distance as short as possible. An old residential area was used as an example. It is suggested that 113 parking spaces in
residential area and 100 on-road parking spaces were provided. Time allowing to parking on road was between 19:00 to the next day 8:00. When the demand of on-road parking isn’t over 130, the parking optimization model of old residential areas can relieve parking contradiction of old residential area.

**KEYWORDS:** old residential areas, on-road parking, parking layout
基于VISSIM小区开放对周围道路影响的仿真模拟研究

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摘 要: 在小区开放政策提出的背景下，小区开放可能会对周边道路通行能力产生影响，本文通过建立安全距离模型，选取停车次数、车均延误、总行程时间、车均停车次数、总延误时间、总停车延误和平均车速用以评价小区开放对周边道路通行能力的影响。以沈阳市为例，选择两个小区，道路模式分别为环状道路模式和树状道路模式，借助VISSIM交通仿真软件进行定量分析。结果表明，开放小区明显改善了周围道路通行能力，且不同内部结构的小区开放对道路通行能力产生的影响不同。本研究对开放小区的政策实施具有重要意义。

关键词: 交通工程；开放小区；通行能力；安全距离模型；VISSIM

中图分类号: U491

Study of the Influence of the Open Housing Estates on the Surrounding Roads Based on VISSIM

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Abstract: Under the open housing estate policy, the open may have different impact on the surrounding road traffic capacity, this paper built safety distance model, select car parking number, car delay, total travel time delay, car parking delay, car average parking number, total delay time, total stop delay and average speed to evaluate the impact on the surrounding traffic capacity. In shenyang for example, choose two village, the road model respectively ring road model and tree model of the road, carries on the quantitative analysis by using VISSIM traffic simulation software. The results show that open area obviously improve the surrounding traffic capacity, different internal structure of the housing
estates opening has different impact on road traffic capacity. This study has great significance to policy implementation of opening housing estates.

**keywords:** traffic engineering; open housing estates; traffic capacity; safety distance model; traffic simulation model VISSIM

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Research on On-street Parking Charging Mode Adjustment in the Central Region of Chengdu

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ABSTRACT

On-street parking policy is an important supplementary way of off-street parking. Reasonable on-street parking price can fully use its short-term parking advantages and improve the turnover rate of parking spaces. Based on the three parking principles: reasonable parking ratio between on-street and off-street parking, region difference pricing and time difference pricing, this paper put forward the on-street parking charging mode adjustment programs in the central region of Chengdu and proposed the "two-step" adjustment implementation strategy in pilot scope of Tianfu square typical region considering parking fee level, parking unit, region difference and time difference by drawing on-street experience from some domestic advanced cities, referring to on-street parking standard of partial second-tier cities and combining the level of economic development and situation of traffic congestion in Chengdu.

KEYWORDS: transport policy; static traffic; charging mode; central region
Study on the Pedestrian Flow Characteristics of Y-shaped Channel

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ABSTRACT
To explore the variation of pedestrian density in merging channel of the subway station, a modified lattice gas model with biased random walkers is proposed to simulate the aggregation process of pedestrian flows in the Y-shaped channel in peak time under open boundary conditions. The model consists of square and triangular lattices, and uses QT simulation program to mimic the pedestrian flow in channels intersected at any angle. We propose the density phase diagram by analyzing the phase transition characteristics of pedestrian flow densities in the Y-shaped channel. Our study shows that the pedestrian flow density of the merging channel changes with variation of the width and offset angle of inlet channels. We use both theoretical analysis and actual investigation to prove the accuracy of the simulation results. We find that for the Y-shaped channel with the same inlet channel width, the
dynamic transition occurs at the inlet channel densities are 0.4 and 0.3 respectively, and the merging channel density is at around 0.5. In addition, the critical density of merging pedestrian flow decreases with the channel width ratio increasing and increases with the offset angle increasing.

**KEYWORDS:** Y-Shaped Channel; Pedestrian Flow; Lattice Gas Model; Model Simulation
中国智慧高速发展现状与理论体系探索

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摘要：作为智慧交通系统在高速公路领域的延伸，智慧高速是提升高速公路应急、运营、养护管理和公众出行服务水平的最佳方法。本文介绍了我国典型省份智慧高速的建设思路和现状，探索了智慧高速的定义、主要特点、总体架构、成套关键技术、预期目标等理论体系，提出了智慧高速的实施思路与建议，对国内外智慧高速的研究具有指导意义。

关键词：智能交通；智慧高速；理论体系

中图分类号：U491

Theory Exploration and Development Tendency of Smarter Expressway Systems in China

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Abstract: As the extension in expressway of intelligent transportation system, Smarter Expressway System (SMS) is the best way to improve the ability for emergency response, operation management and traffic information service. Thoughts and tendency of SEM of typical provinces in China are produced, and the theory of SEM is explored, including the definition, key feature, overall architecture, set of techniques, and expected result. In the end, the implementation idea and suggestion of SEM is presented.
keywords: intelligent transportation system; SEM; theory system

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基于模糊贝叶斯决策的城市交通系统优化选择

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摘 要：城市道路交通拥堵问题日益严重，对交通线路进行优化选择可节约时间，降低成本。在此背景下，本文首先基于模糊数学理论，结合决策理论中的损失函数法，提出了连续型的模糊贝叶斯决策方法。具体过程是：将先验信息和样本信息模糊化，利用贝叶斯原理得到更新的模糊后验信息，即模糊后验概率，基于模糊后验概率计算损失指数从而进行决策。最后，以城市道路交通系统的畅通状况为研究应用对象，利用提出的模糊贝叶斯决策方法对道路畅通状况进行评估，选择最合适的线路。结果表明，利用提出的连续模糊贝叶斯决策方法对道路交通网络进行优化选择是可行的，达到了优化决策的目的。

关键词：城市交通；优化选择；模糊贝叶斯决策；交通线路；畅通可靠度

Optimization of Urban Traffic System Based on Fuzzy Bayesian Decision-making Method

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Abstract: In recent years, urban traffic congestion has been deteriorating, and optimizing and choosing the transport routes can be conductive to save time and reduce costs. The goal of this paper is, based on the fuzzy mathematics and the loss function of decision-making theory, to present one continuous fuzzy Bayesian decision-making method. The process of proposing the continuous fuzzy Bayesian decision-making method is, ① obtain the fuzzy priori information and the fuzzy sample information using the fuzzy theory; ② obtain the fuzzy posteriori information updated using the Bayesian theory, actually which is the fuzzy posteriori probability; ③ make decisions based on the computation of loss index utilizing the fuzzy posteriori probability. In addition, the actual situations of urban traffic system is accepted as the research object of this paper. Finally, the evaluation of it is conducted using the
presented continuous fuzzy Bayesian decision-making method in order to select the most appropriate routes. The case study indicates the feasibility of the application of the continuous fuzzy Bayesian decision-making method for optimization and choice of the urban traffic system. The purpose of optimizing and choosing the transport routes is well achieved.

**keywords:** urban traffic; optimization and choice; Fuzzy Bayesian decision; transport route; travel reliability

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考虑用户冲突的停车共享方案优化研究

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摘 要：随着机动车保有量的快速增加，大都市中心区用地的有限导致停车位不足，停车问题成为交通规划与管理的一个组成部分，高效的停车管理变得与道路交通拥堵控制同样重要。另一方面，由于工作外出，许多居民区的私人车位在白天处于空闲状态。这些空置的停车位是可以通过停车共享得到有效的利用，以满足到附近工作、购物或其他活动的司机的停车需求。然而，停车共享的实施必须要解决一个问题，即：车位提供者与使用者之间的冲突。本文的主要研究如何实施停车共享，使得在避免冲突的情况下停车管理者收益最大。

关键词：城市交通；停车共享；用户冲突；线性规划

中图分类号：U491

Research on Optimization of Parking Sharing Scheme Considering User Conflict

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Abstract: With the rapid increase of vehicle population and land shortage of urban center, parking problem becomes an integral part of transportation planning and management. Efficient parking management is as important as road congestion control. On the other hand, due to out of work, many residential areas of private parking spaces are in idle state during day time. These vacant parking spaces can be effectively used by parking sharing to meet the parking demand of nearby work, shopping or other activities of drivers. However, the implementation of parking sharing must solve a problem, that
is, the conflict between the provider and the user. This paper focuses on how to implement the parking sharing, so that in the case of conflict avoidance parking managers gain the most.

**keywords:** urban traffic; parking sharing; user conflict; linear programming

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基于维修数据和改进FMEA方法的汽车质量缺陷水平评价研究

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摘要：随着汽车产业蓬勃发展，对汽车质量缺陷水平评价成为了越来越重要的工作。而传统的检测方法比较费时费力，因此本文以汽车维修数据为依托，结合改进的FMEA分析方法，提出了一种基于故障发生概率和所需维修费用的风险顺序数（RPN）分析方法来评价汽车质量缺陷水平，并分析结果和对车辆故障事件进行质量缺陷等级划分，以一款北京现代轻型客车为例进行方法可行性分析，实践表明在维修数据充足的情况下，该评价方法是比较符合车辆实际使用状况的。

关键词：汽车质量缺陷水平；维修费用；发生概率；风险顺序数

Research on Evaluation of Automobile Quality Defect Level Based on Maintenance Data and Improved FMEA Analysis Method

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Abstract: With the vigorous development of the automobile industry, the evaluation of the quality of automobile defects has become an increasingly important task. In this paper, based on the vehicle maintenance data and the improved FMEA analysis method, this paper presents a Risk Priority Number (RPN) analysis method based on the probability of failure and the required maintenance cost to evaluate the quality of the vehicle Defect level, and analysis of the results and the quality of the vehicle fault classification. Finally, the feasibility analysis of a method is presented in this paper. The practice shows that the evaluation method is more in line with the actual use of the vehicle under the condition of sufficient maintenance data.

Key words: Automobile quality defect level; Repair fees; The probability of occurrence; Risk Priority Number

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Shock Wave Based Ray Tracing Method for Travel Time Estimation

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ABSTRACT

Travel time has been recognized as one of the most important performance measures of transportation system. This paper presents a ray tracing method for travel time estimation by following shock wave generation and propagation within a link. The proposed method is a physics driven approach, and meanwhile vehicle trajectories are also estimated. As a mechanism-based method, it provides a physical interpretation on how vehicle traverses a stretch of roadway. The ray tracing method is compared to other conventional methods by using both field experiment and microscopic simulation, suggesting that the former exhibits more accurate and robust estimation results. It was
found that as the proposed method can make the best of traffic data (speed, density, flow rate) to trace the real vehicle speed trajectories, it yields much better performance than other methods during transition flow and congestion, which is vital for a travel time estimation method.

**KEYWORDS:** shock wave, ray tracing, travel time, estimation, simulation
基于回归分析的高速公路弯坡段小型车运行速度预测模型

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摘 要: 在大量实测数据基础上, 本文深入探讨小型车在高速公路自由流运行状态下其运行速度的变化规律, 确定了影响弯坡路段车速的公路线形因素包括曲线半径、坡度、转角值, 建立了自由流小型车弯坡路段运行速度预测模型, 并利用实测数据对模型进行验证, 同时也为道路规范和标准中使用运行车速线形设计方法提供数据支持。

关键词: 运行速度; 弯坡组合路段; 模型; 回归分析

A Model for Predicting the Operating Speed of Small Cars on the Expressway Slope Section Based on Regression Analysis

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Abstract: Based on a large amount of measured data, factors influencing speed and its variation patterns were definitely explored in this paper. Expressway alignment factors influencing speed on curved were determined including curve radius, slope and angle value. The prediction model of the operating speed of small cars under the free flow section is established on curve with slope, and the model was verified by using the measured data. At the same time, it provided data support for geometric design.

Keywords: Operating speed; Curve with slope; Model; Regression analysis

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Research on Recognition Algorithm of Pavement Damage Image Based on Gray Analysis

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Abstract

With the problem of road maintenance and management becoming increasingly prominent, the real-time detection of road surface could reduce the loss caused by pavement disease. In order to solve the problem of the need of road maintenance and management, the purpose of this paper is to improve the efficiency of automatic detection system of pavement damage. After image preprocessing, the classification algorithm combining with sub-block image variance and entropy is used to identify the pavement damaged image by using the neural network. The experimental results show that the proposed algorithm has high efficiency, high detection rate and low false detection rate. It can realize the fast and accurate classification of large-scale pavement images. What’s more, there isn’t damage image in the classification of nonbroken image, which can greatly reduce the workload, laid the foundation for the pavement image automatic detection and identification system development and research.

Keywords: Image recognition, Image local variance, Image local entropy, Neural network
基于交叉口相位自由组合的干线协调控制

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摘 要：针对干线双向绿波带设置的瓶颈，提出一种基于交叉口相位自由组合的方法来设置干线双向绿波带。该方法在保障交叉口通行能力的情况下，能够为干线双向的绿灯起始时刻提供很大的调整区间，从而最大化的提升干线双向的绿波带宽。基于该方法，进一步提出针对两条相交干线网络的协调控制方法，从路径的角度将网络拆分为主要路径和次要路径，并依次设置绿波带，用交叉口相位自由组合的方法来消除各路径绿波带间的冲突。仿真结果指出，该方法能够提升干线与网络路径的绿波带宽，减少延误和停车次数。

关键词：干线协调控制；相位自由组合；双干线网络；主要路径

Arterial Coordinated Control Based on Phase Free Combination of Intersections

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Abstract: This paper proposes a new approach to set two-way green wave for arterial, which based on the method of phases free combination. Under the condition of ensuring the capacity of intersection, this method can provide a large adjustment interval for green start time at a single intersection to maximize the two-way green wave bandwidth. Based on phases free combination, a coordination control strategy for double-arterial network was proposed, which splits the network into primary routes and short routes and sets green wave for these routes sequentially. The simulation results show that new method can reduce the average traffic delay, travel time and stops for arterials and network.

Keywords: arterial coordination control; phases free combination; double-arterial networking; primary routes

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基于直方图特征融合的光线环境分类方法

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摘 要: 在不同光线环境下，由于捕捉的车辆特征不同，车辆检测系统会采用不同的车辆识别算法。为保证昼夜周期内车辆检测的稳定性，对基于实时视频的车辆检测系统而言，光线环境检测不可或缺。本文阐述了基于实时光线环境对昼夜周期时间段（白天, 夜间, 低光（黎明, 黄昏））划分的研究思路，通过对昼夜周期内的光线分析，提出了两种子光线分类器。其中一种子分类器是以背景图像灰度直方图相似度为特征，由K-Means聚类算法对特征数据进行训练生成。另外一种子分类器是以背景图像在RGB颜色空间各通道的直方图分布差异为特征，由朴素贝叶斯算法对特征数据进行训练生成。最后本文将两种子分类器通过权重组合方式生成增强光线分类器。实验证明该光线分类器对于实时光线分类准确性高，提高了系统检测的稳定性。

关键词: 视频监控; 光线分类; 直方图; 车辆检测;

An Effective Lighting Conditions Classification Method Based on Histogram Analysis

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Abstract: To enhance the robustness of the real-time vehicle detection system, an effective algorithm to identify the lighting conditions (daylight, night, lowlight (dawn, dusk)) based on histogram analysis is presented in this paper. The algorithm consists two procedures: extracting and updating background image, and generating a lighting conditions classifier based on background image analysis. In our implementation, the final classifier consists two lighting conditions sub-classifiers generated by different algorithms using weighted combination principle. The first sub-classifier is generated by K-Means algorithm. The second sub-classifier is based on naive Bayes algorithm, and it is classified
by the Bhattacharyya distance of the histogram of each color component (R-component, G-component, B-component) in RGB space. The experiment has shown that the lighting conditions classification method proposed improves the performance in lighting classifications.

**keywords:** Video surveillance; lighting conditions classifier; histogram analysis; Vehicle detection.
基于NL模型分析公共交通票价对出行选择的影响——以北京市为例

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摘 要：大力发展公共交通是我国城市交通系统功能高效发挥的前提。自2006年北京市实施IC卡低票价政策以来，公共交通更是发展迅猛，对缓解城市交通拥堵发挥了不可替代的作用。但同时低票价政策也在一定程度上制约了公共交通的进一步发展。基于此，本文旨在探究公共交通票价变化对乘客出行方式选择的影响，而为北京市公共交通票价调整提出合理建议。本文在对比研究了MNL模型与NL模型机理基础上，选择更具适用性的NL模型构建交通方式选择模型，并以北京市为例，验证了模型的可靠性。最后应用模型分别研究了常规公交及地铁票价变化对交通方式选择的影响，得到了不同服务距离下交通方式对票价变化的转移情况。

关键词：SP调查；交通方式选择；NL模型；公共交通票价

Impact of Public Transportation Fare on Modal Choice based on NL Model:
A Case Study of Beijing

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Abstract: A well-developed public transportation is the foundation of the highly efficient urban transportation system. Since the implementation of the low price policy using IC card in 2006, Beijing public transportation system has been developing rapidly, which has played an important role in reducing traffic jam. On the other hand, the low price policy has influenced the further development of public transportation system to a certain degree. This paper is intended to investigate the influence of the change of public transportation fares on the mode choice of the passengers to provide suggestions for the adjustment of public transportation fares in Beijing. With the comparative analysis of the
MNL model and NL model, the NL model is selected due to its better performance on mode choice modeling. A case study is conducted in Beijing to verify the model. The impacts of the changes of the bus and subway fares on the mode choice are studied by using the proposed model. The shifts among different modes with the fare change are obtained considering different trip distances.

**keywords:** SP survey; traffic alternatives; NL model; public transportation fare

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Adaptive Traffic Signal Coordinated Timing Decision for Adjacent Intersections with Chicken Game

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ABSTRACT
Adaptive traffic signal timing decision is a promising technique to alleviate traffic congestion which is an issue in every major city. An interesting problem is to study the traffic signal timing decision on an intersection, that is an important aspect of the urban traffic control system. According to the mutual relevance of traffic flow between intersections and the theoretical framework of chicken game, traffic signal timing decision model based on chicken game was proposed for two adjacent intersections. Each intersection was defined as a game player and the queue length of the whole intersection was regarded as payoff function. Nash equilibrium of mixed strategies was obtained based on the chicken game model which belongs to a non-cooperative game, so the state of signal light in next game-cycle can be on-line adjusted. The digital characteristics and effectiveness of the proposed method was analyzed. Simulation results showed that the game-based method substantially outperforms the other non-coordinated method like fixed timing control. The queue length of the intersection and the values of the average densities at each lane can be effectively improved using the proposed algorithm.

Keywords: Adaptive traffic signal timing, intersection, chicken game, decision
土地利用混合度对出行方式选择的影响研究

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摘 要：本文研究了土地利用混合度对出行方式选择的影响，构建了评价其混合度的指标体系，提出了土地利用混合度量的相互作用法；利用居民出行调查数据，借助STATA软件研究不同土地利用混合度指标对出行方式选择的影响，并以天水市为对象进行了具体研究。结果表明，相互作用指标对居民出行行为的解释性优良，土地利用混合有助于引导居民选择非机动化出行方式。

关键词：混合土地利用；相互作用指数；出行方式选择；弹性分析

中图分类号：U491

Understanding the Effects of Mixed Land-use on Travel Mode Choice

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Abstract: A novel approach is proposed to measure the extent to which complementary land uses adjoin one another. And the proposed approach is found to be significant in explaining the travel mode choice. Firstly, the coaction method is proposed to measure the land-use mix in a small Chinese city and results suggest that the method can explain mixed extent of land use actually. Then, the data from the 2015 Tianshui household travel survey is used to estimate the models and analysis the land-use effects on travel mode choice by STATA. Finally, the proposed coaction method is found be significant in explaining travel behavior, which indicates that the mixing of complementary land uses can help guide residents to choose non-motorized modes.
Keywords: Mixed land use; Coaction index; Mode choice; Elasticity analysis

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信号交叉口可变导向车道驾驶员适应性研究

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摘要: 可变导向车道是提升信号交叉口通行效率的交通管理工程措施, 近年来逐步得到推广应用。为了提高信号交叉口可变导向车道的利用率, 基于调查问卷结果, 建立针对可变导向车道使用频率的Ordered Probit模型, 分析影响交叉口可变导向车道驾驶员适应性的因素。结果表明, 驾驶员的性别、驾龄、在杭州的居住时间、驾驶车型以及信号交叉口的可变导向车道路边标牌、信号指示牌、预信号灯, 对驾驶员的车道选择有显著的影响。此外，针对性的提出了提升可变导向车道利用率的改善建议。

关键词: 信号交叉口; 可变导向车道; 驾驶员适应性; Ordered Probit模型

The Drivers’ Adaptability of the Variable Approach Lane at Signalized Intersection

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Abstract: In recent years, the variable approach lane as a traffic management measure was generalized which is used to improve the efficiency of traffic in signalized intersection. In order to improve the utilization of the variable approach lane, we designed the questionnaire, recycled the data, and an Ordered Probit model of the frequency of utilization was established to analyze the factors which influence the adaptability of drivers. It was found that gender, driving year, living time in Hangzhou, the type of vehicle, roadside sign, signal indicator and pre-signal lamp had great effects. Finally, according to the results of the analysis, the targeted improvement strategies were given to traffic management departments in variable approach lanes affiliated facilities.

Keywords: signalized intersection; variable approach lane; the adaptability of drivers; Ordered Probit model
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综合交通运输信息平台建设思考

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摘要：在当今现代信息技术快速发展的大环境下，构建跨部门、跨行业、跨区域的综合交通运输信息平台，是促进交通信息共享交换与业务系统互联互通的重要途径。本文通过深入调研交通运输信息化系统的应用现状，总结了综合交通运输信息化建设存在的问题，提出了建设综合交通运输信息平台的必要性；基于以人为本的基本原则，提出了综合交通运输信息平台的建设目标；结合当前交通运输基础设施建设的基本现状，提出了构建综合交通运输信息平台的基本架构与主要内容，并指出了综合交通运输信息平台建设应采取的组织运行机制和保障策略。

关键词：综合交通；信息平台；基本架构

中图分类号：U238

Thoughts on Building Integrated Transportation Information Platform

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Abstract: With the rapid development of information technology, the construction of cross-sectoral, cross-industry, cross-regional Integrated Transportation Information Platform (ITIP) is an effective way to improve the information sharing and exchanges, traffic system interconnection. This paper thoroughly investigated the current status of transportation information system and its applications, and then summarized the possible problems in constructions of ITIP, and finally pointed out the necessity of constructing ITIP. Based on the “people-oriented” principles, this study proposed the construction goal of ITIP. Considering the current situations of the transport infrastructure construction, this paper also put forward the basic structure and main contents of constructing ITIP, as well as the organizational
operation mechanism and safeguard strategy which should be adopted in the construction of integrated transportation information platform.

**Keywords:** integrated traffic; information platform; basic structure

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北纬45°高寒地区铁路电气化关键技术研究

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摘 要：我国铁路电气化改造标准设计只有-40℃以上气温时标准，面对-50℃气温地区的电气化改造既无标准数据又无实践经验。百年铁路滨洲线地处北纬45°40′至49°34′属于高纬度、高寒地区铁路，沿线极端低温达-50℃，接触网补偿器坠砣串需要及时调整重力使线索的张力保持平衡，因冻土层深支柱埋深达4.2米；滨洲线承担着哈尔滨铁路局57%的运量，年货物运输能力超过一亿吨。“三度电一升油”电气化改造后滨洲线每年节省10亿元牵引能源费用。滨洲铁路是哈尔滨铁路局第一条电气化改造线路也是我国北纬45°以上高寒地区第一条电气化铁路。本文可供地处北纬45°以上地区和国家参考。

关键词：电气化铁路；经济环保

Research on the Key Technology of Railway Electrification 45 Degrees North Latitude Alpine Region

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Abstract: China Railway Electrification design standard is only -40 degrees above the temperature standard, with -50℃ temperature area electrification neither standard data and practical experience. One hundred years of Binzhou railway line in latitude 45 degrees 40 minutes to 49 degrees 34 ‘belongs to the railway high latitude and cold regions, along the extreme low temperature of -50 DEG C, contact net weight on compensator to adjust the gravity of the wire tension balance, because the frozen soil depth of 4.2 meters deep pillar; Binzhou lines the undertaker of Harbin Railway Bureau, the volume of 57%, more than one hundred million tons of cargo transport capacity. "Three degrees electricity 1 liter of oil" after
the transformation of the electrical transformation of the coast line to save 1 billion yuan per year traction energy costs. Binzhou railway is the Harbin Railway Bureau, the first line electrification in China is above 45 degrees north latitude alpine region of the first electrified railway. This paper can be located in area of more than 45 degrees north latitude and the national reference.

**Keywords:** Electrified railway; Economic environmental protection

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A Study on Kinematics of Wrap Projection of Pedestrian Accidents Based on Simulation and NAIS Real-world Data in China

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Abstract

In the analysis of vehicle-pedestrian accidents, the movement traces of pedestrian could be used to analyze vehicle’s impact speed which is one of the most important parameter for accident reconstruction. Wrap projection impact, which is the most common pedestrian accident type involved low-long-front vehicle (car), was researched in this paper. Firstly, simulation models of vehicle-pedestrian impact were constructed based on accident simulation software PC-Crash, and various data were obtained by means of simulation tests. Then, pedestrian projection kinematics was in-depth analyzed from the view of relationships between impact speed and other parameters such as throw distance, apogee height, rotation number, and launch angle, etc…Besides, new pedestrian throw distance formulas were proposed by power function. Finally, 51 real-world accidents (including 23 accidents with surveillance videos) from NAIS (National Automobile Accident Investigation System) database were used to verify the simulation results and the newly developed model. The new model was also compared with the other models. The results are useful for forensic investigation of pedestrian accident.

Keywords: accident reconstruction; vehicle-pedestrian accident; pedestrian throw distance; wrap projection; NAIS
The Study of Road Traffic Safety Evaluation Based on Gray Clustering Mode

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ABSTRACT

In view of the current traffic safety evaluation research in local and foreign countries, in order to better evaluate the level of traffic safety of different parts, a evaluated traffic safety method is posed based on gray clustering model, evaluating the reality traffic safety for example 17 cities of Shandong Province China, the results showed that this method could better reflection road traffic safety situation of each city.

Keywords: gray clustering; road traffic safety; evaluation
Study on Risk Prevention of Terrorist Attacks in the Subway Station Based on Game Theory

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Abstract: Subway terrorist attacks have become a more and more serious social crisis, how to analyze the subway terrorist attacks quantitatively has become a serious problem to solve urgently. Terrorist attacks of the subway station can be seen as a zero-sum game between the attackers (Terrorists) and defenders (the subway station managers). On the basis of the classical risk theory, this article
determines the defense resource allocation for each subway station based on the maximum value of the minimum theory, one of the zero-sum game theory. And then the author calculates the risk of terrorist attacks in the subway stations at the aspects of the targets’ probable losses and the degrees of the losses. The author realizes the quantitative calculation of the risk of terrorist attacks and calculates the optimal allocation of defense resources and the degrees of the loss of each subway stations by the assumption that the terrorists attack the underground with 1kg TNT. In order to introduce the method, the author takes a subway station for an example to quantitatively calculate the defense resource allocation and the risk. Through the Matlab, this article draws the figures of the relationship between the defense resources and the minimum expected risk of the example, which show that the minimum expected losses are proportional to the inherent risks, and are inversely proportional to the defense resources. Through the example, it is proved that the calculation method is feasible for quantitative risk analysis of terrorist attacks in the subway station, which provides a reference for the quantitative risk analysis of terrorist attacks in the subway station and the development of the safety precautions.

**Keywords:** Public Safety; Subway terrorist attack; Quantitative calculation of risk; Game Theory
基于泊松过程的重特大道路交通事故统计规律分析

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摘  要：交通事故的发生具有偶然性，针对我国交通安全形势严峻、重特大道路交通事故频发的现状，利用非齐次泊松过程的理论方法，对近10多年来我国重特大道路交通事故的统计规律进行分析，从而研判当前重特大交通事故所处阶段和发展趋势。分析结果表明：重特大交通事故起数在2000-2015年期间呈现下降趋势，表现出一定的周期性反弹，事故的安全形势已经由高发状态转化为低发状态，但是每月发生事故的风险仍然较高，因此仍须保持警惕，预防重特大交通事故的发生。这些结论可以为预防重特大道路交通事故工作提供参考和帮助。

关键词：重特大道路交通事故；泊松过程；发生强度；发生间隔；发生风险

Statistical Analysis of Major Road Traffic Accidents Based on Poisson Process

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Abstract: The occurrence of traffic accidents demonstrates contingency. For China ‘s severe traffic security situation and frequent occurrence of major road traffic accidents, the paper analyzes the statistical laws of the country’s major road traffic accidents over the past ten years with the theoretical method of nonhomogeneous poisson process, thereby studying and determining its current phase and development trend of major traffic accidents. The analytical results show: major traffic accidents tend decrease from 2000 to 2015, reflecting a cyclical rebound. The security situation of accidents has transited from highly frequent occurrence to lowly-frequent occurrence. However, there is still high risk for the presence of accidents every month. Therefore, it is necessary to keep alert and prevent the
occurrence of major traffic accidents. These conclusions can provide reference and help for prevention of major road traffic accidents.

**Keywords:** Major Road Traffic Accidents; Poisson Process; Occurrence Incidence; Occurrence Interval; Risks of Occurrence
重特大道路交通事故频数预测与分析

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摘要：重特大道路交通事故是指一次死亡10人以上（含10人）的道路交通事故，其随机性强、致死率高、危害性大，给人民生活和社会稳定带来了严重的负面影响。本文以1996-2012年重特大道路交通事故为样本，基于时间序列分析和灰色预测模型建立组合预测模型，旨在揭示此类事故的年际变化规律以及预测其未来年的整体水平。结果显示，以误差平方和极小化为目标函数的最优加权组合预测模型最适合此类事故的频数预测。同时，1996-2012年重特大道路交通事故整体上保持下降趋势并且下降幅度随着时间的延长在逐渐变缓；2013-2017年此类事故继续保持下降趋势并趋于平稳，事故频数稳定在每年15起左右。

关键词：重特大道路交通事故；事故预测；时间序列分析；灰色预测；组合预测

Prediction and Analysis of the Number of the Serious Multi-fatality Crashes in China

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Abstract: The Serious Multi-fatality Crash (SMC) is defined as a motor-vehicle crash that occurs on a road and results in more than 10 deaths (including 10 deaths). Such crashes have characteristics of randomness, high fatal rate, and grave consequence, which cast a negative impact on peoples’ living and social stability. Based on the SMCs from 1996 to 2012, this paper attempts to adopt time series analysis and grey prediction model to develop various combined prediction models, in order to identify their rule of inter-annual variations and to predict their overall levels in next years. Results show that
the combined prediction model with optimal weights minimizing the sum of squared error is the most appropriate for the prediction of the number of SMCs. Moreover, the SMCs from 1996 to 2012 keep a descending trend, but the range is getting smaller and smaller as time goes on. Such crashes from 2013 to 2017 carry on keeping the descending trend and approach the level-off and the number of the SMCs stays about 15 per year.

**Keywords:** the Serious Multi-fatality Crashes, Crash Prediction, Time Series Analysis, Grey Prediction, Combined Prediction

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Risk Transfer Mechanism of Fresh Agricultural Product Supply Chain

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ABSTRACT

Fresh agricultural products have characteristics as putrescibility and fragility, which leads to risk in supply chain to some extent. Besides, the risk is transmissible. This paper aims to study the mechanism of risk transfer in fresh agricultural product in terms of the conditions, progress, direction, paths, and speed. Based on the analysis of risk conduction model, the author draw a conclusion. Strength and speed of risks in the process of conducting are closely related to conductivity coefficient of risk. The intensity of risk conduction process is subject to risk energy transfer and its transfer rate.

KeyWords: Fresh Agricultural Product; Risk Transfer; Supply Chain
基于碰撞试验的车辆碰撞声信号特征提取研究

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摘 要: 道路交通事故伤害已经成为人类最严重的生命威胁, 正常行驶的车辆发生碰撞后, 乘员不能及时报警救援, 伤亡更为惨重。本文采用声音信号特征提取的方法, 试验搜集了车辆典型碰撞声、自然界雷声、喇叭声等多种交通复合声音信号。通过Matlab工具, 对采集的三类声信号进行频谱分析, 确立了在重大交通事故中车辆碰撞声音信号的特征提取可行性。特征提取法的碰撞声研究为重大交通事故后车辆碰撞无人报警救援系统的研究提供了条件。

关键词: 声音信号; 特征提取; 车辆碰撞; Matlab; 频谱分析

中图分类号: U471.15 文献标识码: A

The Research of Extracting Signal Characteristics Induced by Vehicle Collision Based on Collision Test

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Analysis of Factors Affecting Serious Multi-fatality Crashes in China
Based on Bayesian Network Structure

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ABSTRACT

A serious multi-fatality crash is defined as a motor-vehicle crash resulting in more than ten deaths, which causes catastrophic losses of human life and property and even threats social stability. Thus, this study aims to identify and analyze risk factors affecting serious multi-fatality crashes using Bayesian networks. First, a Bayesian network structure was constructed based on expert experience and the Dempster-Shafer evidence theory. Second, the structure was amended to satisfy the conditional independence test. Finally, 484 serious multi-fatality crashes for the period 2000-2012 in China were inputted into the Bayesian network to calculate the posterior probability of each factor. Results showed that the most influential factor was driver behavior, followed by vehicle condition, road condition and...
external environment. And compared to the other behaviors, speeding and mistaken adjustment had
greater influence on serious crashes. The findings in this study provide useful and valuable information
for engineers to take corrective and preventative measures to reduce the probability for serious multi-
fatality crashes.

**Keywords:** Serious Multi-fatality Crashes, Bayesian Network, Dempster-Shafer Evidence Theory,
Risk Factors
试探析“计时培训、按学时收费、先培训后付费”机动车驾驶员培训服务模式的推广和应用

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摘 要："不日新者必日退。" 机动车驾驶员培训行业的发展也需要不断的创新，才能成为一个富有活力、生机勃勃的行业。本文试从定义、意义、当前状况等方面对“计时培训、按学时收费、先培训后付费”机动车驾驶员培训服务模式进行分析并且对该模式的应用和推广提出几点建议。

关键词：驾培行业; 计时培训; 先学后付; 模式的应用和推广

Analysis of the Time Training, According to the Class Fee, First Training After Paying the Driver of the Motor Vehicle Promotion and Application of Training Service Model

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Abstract: "a new day soon will back." The development of motor vehicle driver training industry also needs constant innovation, in order to become a vibrant, vibrant industry. This paper from the aspects of definition, significance, current status of the "time training, according to the school fees, training first pay after the motor vehicle driver training service mode analysis and puts forward some suggestions for the promotion and application of the model.

Keywords: driving training industry; time training; first learning to pay; mode of application and promotion

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Study of Expansion Effect and Conflicts of the Mixed Non-motor Vehicles Flow at Signalized Intersections

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ABSTRACT

The mixed non-motor vehicles are significant parts of urban road traffic in China. This paper analyzes the expansion effect of the mixed non-motor vehicles at signalized intersections and defines the concept of expansion width. Based on the law of conservation of flow, the width of bicycles flow and electric bicycles flow in the mixed non-motor vehicles flow are calculated respectively and their relationship is analyzed. Then we get the lateral width of the mixed non-motor vehicles flow which passes the intersections. After studying the streamlines of motor vehicles and mixed non-motor vehicles which turn left or go straight at the signalized intersections, we analyze the conditions of the conflicts between motor vehicles and expanding mixed non-motor vehicles. This paper will be helpful to the design, organization, management and evaluation of the signalized intersections.

Keywords: Mixed non-motor vehicles flow; Expansion; Signalized intersection; Expansion width; Conflict
Setting of Traffic Safety Facilities at First-class Highway Intersections

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Abstract
In view of the situation of multiple accidents at the intersections of first-class highway, through field investigation of some first-class highways in service in china, this paper analyzes the existing problems of traffic safety facilities at the intersections, provides the classification method of intersections based on the function of the intersected roads, the form of access and the impact on the traffic flow in mainline. The intersection has been classified into three types: ordinary plane intersection, small intersection and road side entrance. The traffic security technologies and countermeasures for all kinds of intersections are proposed in terms of the traffic signal control setting, the improvement of warning measures, the reduced speed of the vehicle, the safe line-of-sight measures at median strip opening, and the size of the opening. The main outcome is a more complete standardization setting of traffic safety facilities for first-class highway intersections.

Keywords: First-class highway; Intersection; Traffic safety facilities; Classification method of intersections; Setting proposal
An Investigation into Driver Behavior and Driving Ability under Reduced Visibility Conditions

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ABSTRACT:

The objective of this study was to explore the impact of low visibility conditions on driving behavior and driving ability. The present study employed a sample of 314 participants and a self-reported questionnaire to investigate different types of driving behavior and driving ability under low visibility conditions. Factor analyses, bivariate correlation analyses, independent t-tests and hierarchical regression analyses were used to investigate the relationships between variables. Technical driving ability and risk perception were significantly related to driving years, yearly mileage and the frequency of driving on the freeway in low visibility conditions. The number of penalty points and the number of accidents experienced under low visibility conditions were also related to violations and slips. In addition, the risk perception of low visibility affected the three types of driving behavior, and technical driving ability may have affected slips.

Keywords: Traffic safety, Reduced visibility, Driver’s behavior, Driving ability, Questionnaire
The Application of Deep Auto-encoder (DAE) Based on Sparse Theory in Highway Accident Casualty Forecast

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ABSTRACT

Highway transportation, as one of China's five major transportation modes, bears the task of passenger and freight transportation related to national economy and social development. Meanwhile, traffic safety has attracted broad interests of many experts and scholars for a long time. So, accurate forecast of highway accident casualties is of great significance for the assurance of China's future traffic safety situation, the implement of corresponding measures to improve road safety as well as the realization of transportation system optimization. This paper innovatively takes deep auto-encoder (DAE) based on the theory of sparse into the prediction of the highway accident death and injury number. Then it constructs accident casualty forecast model using historical data of casualty from 2000-
2014, and achieves that the average error rates are 7.60%, 2.92% of death toll and injury separately. This paper also constructs accident casualty forecast model using historical data of car ownership, GDP, the total mileage of the highway, Road area per capita of the same time as the influence factors of highway accident casualty, and achieves that the average error rates are 8.97%, 5.49% of death toll and injury separately. By comparison, high precision of the model can be acquired by applying deep auto-encoder (DAE) based on sparse theory into the prediction of road accident casualties, and the accuracy of model based on time series data of death toll and injury is higher than the model which uses indexes. So this paper uses the former model to forecast the casualties of unpublished data of 2015, 2016 and the next data of 2017-2020, then it assesses the overall China's highway accident situation in the future as well as gives suggestions to the traffic management department.

**Keywords:** Sparse Theory; Deep Auto-encoder; Highway Accident; Casualty Forecast
Effects of Bus Station Forms on Driver's Heart Rate and Respiration Rate

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ABSTRACT

In order to improve bus driving safety, a real vehicle test was designed and conducted. BioLAB was used to collect and analyze drivers' heart rate (HR), inter bits intervals (IBI) and respiratory rate (Respiratory Rate) under linear and harbor station.

The results showed that there were significant differences in drivers' heart rate and respiration rate under linear and harbor stations. The maximum value of drivers' heart rate under linear station was smaller than that under harbor station. Drivers' heart rate change under linear station was obviously beyond normal range; the maximum value of drivers' inter bits intervals under linear station was greater than that under harbor station, and the fluctuation was obviously greater. The maximum value of drivers' respiratory rate under linear station was 2.3bpm higher than that under harbor station.

The research shows that, the amount of harbor station should be increased to improve reasonableness. Other efforts should also be made to improve bus drivers' physiological condition and to improve driving safety.

Keywords: urban traffic; station forms; real vehicle test; bus driver; heart rate; inter bits intervals; respiration rate
Safety Evaluation for Aerodrome Operation Management Based on Fuzzy Comprehensive Estimation

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Abstract

According to recent research and relative civil aviation regulations about management of aerodrome operation safety (AOS), dynamic operation characteristics of aircrafts, working vehicles and staffs is combined in the paper. Main factors influencing the management of AOS are analyzed. Mathematical model of management of AOS was built based on fuzzy comprehensive evaluation. Combined the qualitative with quantified analysis method, evaluation indicator system is put forward. Analytic Hierarchy Process is used to build evaluation targets. Main steps of fuzzy comprehensive evaluation for AOS are made out. New management ways and replying measures for improving safety and efficiency of AOS are brought out both regular and emergence. Actual operational example has been used to check practicability and optimization of the research. The experiment result is much better than using tradition.

Keywords: Aerodrome operation safety; safety evaluation; Analytic Hierarchy Process; Fuzzy comprehensive estimation; mathematical model and evaluation target
Estimation of the Vehicle Emissions on Section Level with the Idling and Speed Information

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ABSTRACT
Mesoscopic vehicle emission models play an important role in field of urban emissions reduction. The mesoscopic vehicle emission models were mostly based on the vehicle average speed and the distribution of vehicle specific power (VSP). The VSP distribution is used to describe the traveling details of vehicles. Because of the lack of the traffic information, the non-real-time VSP distribution was mostly used in practice. This method restricted the accuracy of the emission estimation to some extent. In this study, the vehicle idling time percentage and the average speed variation were used to describe the vehicle driving details indirectly in the mesoscopic vehicle emission model. The
two parameters were extracted from the vehicle level and section level floating car data of real time, respectively. The analysis results showed that the model concerning the two parameters could improve the model accuracy effectively.

**Keywords:** Vehicle emissions, Idling behavior, Floating car data, Mesoscopic modeling.
判别驾驶警觉水平的心电指标筛选及性能研究

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摘 要：为了比较分析各项心电指标判别驾驶警觉度的优劣性，本文通过“驾驶模拟实验-随机信号探测”的双重任务范式，得到主、次任务的心电指标以及操作反应时间，运用统计学方法分析各项指标的优劣性以及对驾驶警觉度的敏感性，筛选出表征驾驶警觉度的特征指标并对其进行性能比较。利用驾驶员对随机信号的反应时间评定驾驶警觉度水平和特征指标的筛选：分别对心电指标进行Q型聚类分析，基于“类组间最大间距、类组内最小间距”的原则得到各指标的子集合，并将各子集合所对应的反应时间进行差异性分析与敏感度分析，得到表征驾驶警觉度的各心电指标。最后通过二元Logistic回归分析，比较各指标用于回归预测警觉度的拟合优度，则得到表征驾驶警觉度的敏感度以及拟合度优良的指标。结论：在心电指标中SDNN是表征驾驶警觉度水平敏感度、拟合度、正确性最好的指标。

关键词：双任务；心电指标；指标筛选；方差分析；二元逻辑回归。

Analysis on ECG Multi-indicators Screening and Efficiency Comparison for Driver Vigilance Determination

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Abstract: We conducted a dual task experiment in which the primary task was a driving simulation while the second task was a random signal detection based on the driving simulator for 4 hours. During the experiment the indexes of subjective assessment (KSS scores) and objective assessment (ECG and reaction time of performance) have been used to analyze merits and demerits of the ECG multi-indicators for judging driving vigilance. The reaction time in second task has been measured for vigilance level, while the characteristic index screening for the goal of assessing the efficiency of the featured indicators. The Q-type clustering as featured distance coefficient with ECG indicators has
been carried out for the gradation separately, which guided with the principle of ‘maximum distance between groups, the minimum distance within groups’. Following clustering we screen the indexes which contributed to cluster analysis with ANOVA of reaction time. We validated the reliability of the gradation with the means value analysis. And the Pearson correlation analysis has been made for screening out the most sensitive index of sorts of vigilance. At last, binary logistic regression is described to detect the performance of goodness of fit of the indexes. The result showed SDNN is the most suitable indicator in vigilance featured sensitivity, correctness and goodness of fit.

**Keywords:** dual task, ECG, index screening, ANOVA, binary logistic regression

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A Road Accident Risk Prediction Method Based on Possibility Degree and Severity of Accident

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ABSTRACT

The road accident risk prediction is difficult to carry out effectively, due to the time and actual size of the accident, the location and depth of the impact of the accident are uncertain. Based on the possibility of occurrence of the accident, the paper studies
the prediction method of road accident risk combining accident possibility with severity. The driver characteristics, vehicle information, driving environment and road environment are selected as the calculated indexes for the possibility degree of accident. Basing on the concept of "deviation", it establishes a calculation model for the accident possibility degree and then presents the calculation method for accident severity. Through the establishment of accident possibility degree and severity grade standard, it provides a prediction method of road accident risk grade that can improve the risk prediction system of road and give a guidance on the actual road traffic accident prevention work.

**Keywords:** traffic safety, accident possibility degree, accident severity, deviation, accident risk prediction
Characteristics of Automobile-related Accidents in Urban Area: A Case Study of Beijing

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ABSTRACT
Understanding the nature of traffic accidents is a prerequisite for accident prevention and management. This paper presents an investigation on the characteristics of automobile related accidents in the Economic Technological Development Area of Beijing. A total of 8093 accident records are collected for over three years from 2012 to 2014 and their characteristics are analysed. It is found that 75.6% of the accidents occurred in intersections areas and these accidents had a higher severity. The temporal distributions of accidents by time of day vary substantially between weekday and weekend for this study area. The age range from 30 to 32 has a higher accident frequency than other ages. With the increasing of driving experience, the number of accidents decreases. Weather condition
shows a significant influence on the daily accident frequencies but has no obvious influence on accident type or accident severity. The automobile collisions with pedestrian and automobile collisions with non-motorized vehicles have relatively high severity. The accident records indicate that there exists a possible correlation between the accident frequency and the traffic volume. At last, nonlinear regression analysis is used to estimate the effect of traffic volume on crash occurrences which gives satisfactory results. In other words, the traffic volume has a significant effect on the crashes.

**Keywords:** automobile-related accident, accident characteristics, urban area, regression analysis
基于直接横摆力偶矩控制的中置轴汽车列车操纵稳定性研究

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摘 要: 随着GB 1589-2016的出台，中置轴汽车列车操纵稳定性研究显得极为重要。本文建立了中置轴汽车列车4自由度的参考模型及多自由度非线性仿真模型，并通过单移线实车试验验证了模型的正确性。利用模糊控制和PID控制建立了中置轴汽车列车横摆力偶矩控制（DYC）模型。通过TrukSim及Simulink建立了联合仿真平台，并进行不同附着系数路面上单移线仿真试验。仿真分析结果表明，施加DYC能大幅改善中置轴汽车列车的操纵稳定性，列车横摆角速度后部放大系数和质心侧偏角后部放大系数分别改善26.5%、29.9%，列车最大铰接角速度改善18.4%，大大降低了列车折叠事故发生可能性，提高了中置轴汽车列车运行安全性。

关键词: 汽车工程；操纵稳定性；横摆力偶矩控制；中置轴汽车列车；模糊控制

中图分类号: U469.5

Research on Handing Stability of Truck Center Axle Trailer Train Based on Direct Yaw Moment Control

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Abstract: Research on handing stability of truck center axle trailer train is becoming important with the publish of GB 1589-2016. Reference dynamic model of truck center axle trailer train with 4-DOF and nonlinear simulation model with multi-DOF were established in this paper. Single lane change test was carried out to verify the correctness of the models. Direct Yaw moment Control (DYC) model
was proposed based on PID and fuzzy control. Single lane change test simulations with different road friction coefficient were carried out through the established co-simulation platform based on TruckSim and Simulink. Simulation results show that DYC could improve handing stability of truck center axle trailer train obviously as the rear amplifications for yaw rate and sideslip angle were reduced by 26.5% and 29.9% respectively. The articulated angle rate was reduced by 18.4% and thus decrease the possibility of jack knifing occurring, enhancing the driving safety of center axle trailer train.

**Keywords:** vehicle engineering; handing stability; direct yaw moment control; Truck Center axle trailer Train; fuzzy control

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中置轴汽车列车操纵稳定性及参数优化研究

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摘 要：随着GB 1589-2016的出台，中置轴汽车列车操纵稳定性研究显得尤为重要。本文建立了中置轴汽车列车的力学模型。利用构建的中置轴汽车列车操纵稳定性测试系统开展了列车的单车道变换实车试验，建立了中置轴汽车列车综合评价得分模型，通过均匀试验和线性回归分析理论，对影响中置轴汽车列车操纵稳定性的重要参数进行了优化分析。优化结果表明，牵引车、中置轴挂车的相关指标都得到了改善，列车横摆角速度后部放大系数和侧向加速度后部放大系数分别改善10.57%、10.32%，列车最大铰接角速度改善32.79%，最大载荷转移率改善20.30%。列车综合评价得分由74.66提高到96.41，综合性能得到提高。

关键词：汽车工程；操纵稳定性；参数优化；中置轴汽车列车；试验测试

中图分类号：U469.5

Research on Handing Stability and Parameter Optimization of Truck Center Axle Trailer Train

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Abstract: Research on handing stability of truck center axle trailer train is becoming important with the publish of GB 1589-2016. Dynamic model of truck center axle trailer train was established based on theory of vehicle dynamics in this paper. Detecting system for handing stability of truck center axle trailer train was constructed and single lane change test of it was carried out. Comprehensive evaluation
score model of truck center axle trailer train was proposed to optimize the related parameters which have significant impacts on the handing stability based on the theory of uniform test and multiple linear regression analysis. Optimization results showed that the related indicators of truck and trailer are improved in varying degrees. Rear Amplifications for yaw rate and lateral acceleration are improved 10.57% and 10.32% respectively. The maximum articulation rate and maximum load transfer ratio are improved 32.79% and 20.30%. Comprehensive evaluation score of truck center axle trailer train is improved from 74.66 points to 96.41 points, leading the enhancement of the comprehensive performance.

**Keywords:** vehicle engineering; handing stability; parameter optimization; Truck Center axle trailer train; vehicle testing;

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A Sensor-based Visual Effect Evaluation of Chevron Alignment Signs’ Colors on Drivers through Freeway Curves in Snow and Ice Environment

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Abstract

The ability to quantitatively evaluate the drivers’ visual feedback is already considered as the primary research for reducing the occurrence of crashes in snow & ice (SI) environment. Different colored Chevron alignment signs (Chevrons) have been approved to cause diverse visual effect on the drivers, but the effect of Chevrons on visual feedback as well as driving reaction through curves, especially in snow & ice (SI) environment hasn’t been adequately evaluated. The objective of this study is twofold: (1) an effectively long-termed experiment was designed and developed to test the effect of colored Chevrons on drivers’ version and vehicle speed; (2) a new quantitatively research method with the effect evaluated model (EE) is employed to measure the effect of different colors on the Chevrons. Thirteen licensed drivers were recruited to carry out a natural driving experiment on the section of freeway curves in Jilin, China. And multi-sensor information data were respectively dedicated on the clean surface (CS) and the snow & ice covered surface (SICS). Moreover, fixation duration and pupil size were used to describe the driver’s visual effect, and Cohen’s d was used to evaluate colors’ psychological effect on drivers. The results showed that: (1) As a result of choosing the proper color for Chevrons, their positive psychological effect on drivers driving on the curves in
SI environment was enhanced, while the speed of vehicles at the approach of the curves was reduced. (2) It was easier for drivers to identify the road alignment after the setting of Chevrons. The visual recognition ability of drivers showed a significant difference in SI environment. (3) Evaluation results of Cohen’s d show that different color Chevrons has different effect size. All color Chevrons in CS were medium size ($0.2 < d < 0.5$). For SICS, red and green Chevrons were medium size ($0.2 < d < 0.5$), while blue Chevrons was small size ($d < 0.2$). The conclusions can provide reference evidence for the development of freeway warning products and the design of intelligent vehicles.

**Keywords:** Freeway curves; snow & ice environment; Chevron alignment sign; visual effect of color; Cohen’s d
The Evaluation Analysis of Design Code about the Road Design of Longitudinal Gradient in the Mountain Road

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Abstract

In recent years the highway develops rapidly in China, by the end of 2014, the total mileage of China’s highway has reached 4.3 million kilometers. Among those, the total mileages of the speedway broke through the bottleneck of 110 thousand kilometers - which ranks the first in the world. With the fast development of basic traffic construction, the problem of safety has become more and more significant. However, some highway (especially, the long longitudinal gradient in the mountain area) has the high accident rate, which caused serious casualties and a great loss of social economy. Aim to this condition, the roads with high accident rate were investigated and analyzed in this paper and the reasons caused accident were studied. The research shows that, besides the carelessness of drivers and the deficiency of the vehicles, the phenomenon of continuous long down design was the same character among those mountain roads .Although those design were not beyond the limiting value, but the maximum longitudinal slope length and slope values almost reach the specification limit frequently, so the rationality of the road design regulations on continuous long down in the mountain road is also worthy of consideration. In this paper, based on the project case of the highway from Shizhong to HeXi in FuJian province, the operational safety of this road was estimated based on the security analysis method of USA, the study shows that, the highway’s parameter on the longitudinal gradient is in accordance with Chinese design regulations, but according to the, the danger coefficient is very high in this section of accident highway, which dues to frequently traffic accident. In conclusion, the design regulations of the highway should be improved gradually to assure the traffic safety of highway.

Keywords: highway; longitudinal gradient; accident rate; security analysis; design regulation
使用手机对驾驶员心率变异性的影响分析

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摘 要：驾驶过程中使用手机会增加驾驶员的心理负荷，驾驶员的生理心理变化对驾驶行为产生影响，进而增加道路交通事故发生的概率。本文总结了国内外对驾驶过程中驾驶员使用手机时心率变异性指标的研究状况。基于Logitech模拟驾驶器，在一般性电话通话、干扰性电话通话和微信语音通话三种使用手机模拟场景下，通过MINDWARE系统采集驾驶员心率变异性各指标，分析得到三种场景下心电波形图、心搏间期序列、心动周期时间序列的频谱等，从心率变异性指标变化得出使用手机对驾驶员生理心理的影响。结果发现：微信语音通话对驾驶人心率变异性指标的影响最大，干扰性电话通话次之，一般性电话通话影响最小。

关键词：驾驶员心理；手机；心率变异性；影响分析；模拟驾驶器

Analysis of Influence of Using Mobile Phone on Driver's Heart Rate Variability

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Abstract: Using mobile phone in the process of driving will increase driver’s psychology load, the driver's physiology and psychology changes have an influence on driving behaviors, thus increasing the probability of road traffic accidents. This paper summarizes the domestic and foreign research status on the driver's heart rate variability when using mobile phone. Based on Logitech driving simulator, in the three communication conditions of using mobile phone, the general call, disturbing call and Wechat-voice, adopting the MINDWARE system to collect the indicators of drivers heart rate variability, and the ECG waveform, heart period time series, heart rate power spectrum and so on under the three conditions are analyzed, and the influence on driver's physiology and psychology are
drawn from the changes of heart rate variability indicators. Results found that Wechat-voice has the most significant influence on the driver's heart rate variability, the second is the disturbing call, and the general call is the least.

**Keywords:** Driver's psychology; phone; heart rate variability; influence analysis; driving simulator
机内净化技术降低船用低速柴油机NOx排放的数值模拟

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摘 要: 为了满足日益严格的国际排放法规要求, 探究机内净化技术对船用低速二冲程柴油机降低NOx排放的潜力, 采用AVL BOOST软件建立6S50ME-C柴油机的整机仿真模型, 研究排气阀晚关米勒循环和预喷射对柴油机燃烧和排放的影响。研究结果表明: 推迟排气阀关闭可以减小NOx的排放, 但经济性变差; 排气阀关闭度过推迟, 则导致滞燃期延长、预混合燃烧的放热率峰值增大, 缸内平均燃烧温度升高过快, 使NOx排放量增大, 同时引起经济性恶化; 预喷油模式可以弥补经济性恶化, 同时结合推迟主喷正时能使NOx排放进一步降低。采用优化后的米勒正时和预喷油方案, 即排气阀关闭角推迟20 deg, 主喷正时延迟1 deg, 可以使柴油机的NOx排放降低15.3%, 而油耗率仅增加1.5%。

关键词: 船用低速柴油机; 米勒循环; 预喷射; NOx排放; 数值模拟

Numerical Simulation on Decreasing NOx Emission of Marine Low-speed Diesel Engine by Using In-cylinder Purifying Technique

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Abstract: In order to meet the requirements of increasingly stringent international emission regulations, this paper explores the decreasing NOx emission potential of in-cylinder purifying technique for marine low-speed two-stroke diesel engine. The effect of late exhaust valve closing Miller cycle and pilot injection on combustion and emissions of 6S50ME-C diesel engine is analyzed based on a AVL BOOST computational model. The research results show that the closing time of exhaust valve can be delayed to decrease the NOx emission, however, increase the fuel consumption.
The closing time of exhaust valve can be excessively delayed to prolonged the ignition delay. As a consequence, premixed combustion develops quickly, increasing the average combustion temperature and favoring the NOx formation, meanwhile, causing the economic deterioration. The pilot injection can be used to compensate economic deterioration, meanwhile it can also reduce the NOx emission further in conjunction with the delay of main injection timing. After the optimization of the Miller timing and pilot injection model, that is, the exhaust valve closing timing is delayed 20 deg, the main injection timing is delayed 2 deg, the diesel engine’s NOx emission can be reduced by 15.3%, while the fuel consumption rate can be increased by only 1.5%.

**Keywords:** marine low-speed diesel engine; Miller cycle; pilot injection; NOx emission; numerical simulation

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基于羊群效应的春运摩托车返乡潮现象的博弈分析

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摘 要: 为了给交通安全隐患严重的春运摩托车返乡潮现象制定安全管理对策,对其返乡现象形成机理进行研究。以博弈论羊群效应模型为基础,构建两人博弈模型,并用Matlab对模型进行仿真模拟。根据对仿真结果的分析,构建民众与社会管理者之间的演化博弈模型,通过对模型求解、分析得出公路管理部门和交管部门针对性的安全对策。研究结果为社会管理部门采取综合措施提高春运交通安全提供了科学依据,对促进建设和谐社会具有积极的现实意义。

关键词: 交通安全; 羊群效应; 骑车风险; 摩托车; 博弈分析

中图分类号: U238

The Game Theory Analysis of the Tidal Phenomenon in Spring Festival Resulted from Motorcycle Based on Herd Effect

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Abstract: In order to make safety management measures for the tidal phenomenon in spring festival resulted from motorcycle which had a serious safety risks. Making a research on its formation mechanism was very important. Based on the game theory of herding behavioural model, this paper constructed a two-person game model and simulated this model with Matlab. According to the analysis of the simulation results, this essay built a game model between government and people. By analyzing this model, the targeted safety measures aimed to the highway management department and traffic control department respectively can be put forward. The study results showed that it can provide a
scientific basis for the governor to ensure the safety of traffic, which is significant for reducing traffic accident and promoting social harmony.

Keywords: traffic safety; herd effect; riding risk; motorcycle; game theory analysis;

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灾害天气下桥梁运营的风险评估技术研究——以苏通大桥为例

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摘 要：苏通大桥桥区地域自然环境复杂，灾害性气候多发，为提高灾害天气条件下的行车安全性，开展在灾害气候发生条件下，桥梁运营风险评估技术的研究。经统计分析后得出，影响苏通大桥运营的灾害天气主要包括雨、雪、雾、冰、风、高温以及风雨、冰雪和冰雾等。本文基于调查问卷数据采用专家评价法和有序 Logit 模型进行风险评估，并以苏通大桥为例说明所采用的方法流程，通过分析得到不同天气类型下交通运行安全的风险水平以及对应的发生概率，进而使得驾驶员能够认知周围风险的存在性，同时也能为管理者制定合适的应急预案提供依据，减少交通事故的发生。

关键词：专家评价法; 层次分析法; 有序 Logit 模型; 风险评估; 灾害天气

Study on Risk Assessment Technology of Bridge Operation in Disaster Weather: Taking Sutong Bridge as an Example

Ma Xiaoli, Lu Jian

Abstract: The natural environment of Sutong Bridge is complex and disaster-prone climate. In order to improve the traffic safety of bridge, carry out disaster risk assessment technology under the condition of disaster climate, After the statistical analysis, the disaster weather includes rain, snow, fog, ice, wind, high temperature and wind and rain, ice and fog. Based on the data form questionnaire survey, expert assessment method and ordered Logit model were used. And the Sutong Bridge was considered as an example to illustrate the method flow, risk levels of traffic safety and corresponding probability of occurrence under various weather conditions were obtained by the theoretical analysis, which would effectively assist the driver to recognize the surrounding driving risk, but also for managers to develop appropriate contingency plans to provide the basis, to reduce the occurrence of traffic accidents.

Keywords: expert assessment method, AHP, ordered Logit model, risk assessment, disaster weather

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基于行车视觉对安全影响的公路景观营造对策

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摘 要：行车过程中80%以上的交通信息是通过视觉获得的，公路视觉环境对行车安全的影响很大。本文在公路景观与行车安全的相关研究的基础上，分析行车视觉与行车安全的关系，并总结公路景观对行车安全的影响，包括公路景观的安全功能与存在的安全问题两个方面。在此基础上提出基于视觉优化的公路景观营造对策。

关键词：公路；景观设计；行车安全；视觉环境

Highway Landscape Construction Countermeasures Based on the Impact of Driving Vision on Safety

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Abstract: More than 80% of the traffic information is obtained by vision, and the visual environment has great influence on driving safety. Based on the related research of highway landscape and traffic safety on the analysis of the relationship between driving vision and traffic safety, and the influence of highway landscape on traffic safety, including two aspects of safety function of highway landscape and the existing security problems. On this basis, the paper puts forward the highway landscape construction countermeasures based on visual optimization.

Keywords: highway; landscape design; traffic safety; visual environment

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特殊气象条件对交通出行安全影响的研究综述

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摘 要：为研究特殊气象条件对交通出行安全的影响，综述了国内外在交通安全影响和安全保障技术方面的研究，分析了常见灾害性天气对道路交通流和交通出行安全的影响以及特殊气象条件下交通安全保障技术研究与应用。通过研究不同的天气条件下的道路交通特性，提出了针对特殊天气条件下完善道路交通安全管理和交通事故的预防和对策研究提供理论依据。

关键词：特殊气象条件; 交通安全; 不良影响; 对策


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Abstract: In order to study the influence of special meteorological conditions on the safety of traffic travel, this paper summarizes the research on the influence of traffic safety and the safety assurance technology at home and abroad, the influence of common disastrous weather on road traffic flow and traffic safety and the research and application of traffic safety assurance technology under special weather conditions are analyzed. Based on the study of the traffic characteristics under different weather conditions, the research direction of improving road traffic safety management under special weather conditions is proposed, and provides theoretical basis for the early warning and countermeasures of traffic safety accidents.

Keywords: special weather conditions; traffic safety; harmful effects; countermeasure

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无人机助力交通行业环境保护的新进展

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摘 要: 在交通环境保护领域，无人机在建设项目的规划、设计、建设到运营的各个阶段，越来越多地发挥着重要作用。利用无人机综合技术，主要包括通过飞行获得图视频资料，进一步建立全数字化的三维地形地物模型，使用地理信息软件进行测量等，进而实现从环境角度分析选线选址的合理性、进行环境影响识别、提出环境保护措施，和工程量定量计算的目的。今后将研发更专业的无人机系统，以及在无人机数字化模型的基础上，开展大数据云数据库、智能交通等深层次的研究和应用，服务于我国和“一路一带”交通基础设施的环境保护。

关键词: 无人机系统, 交通运输, 环境保护, 环境监理, 水土保持

中图分类号: X-1

New Progress of Environmental Protection for Unmanned Aerial Vehicle in Assisting Transport Industry

Abstract: Unmanned aerial vehicles (UAVs) have been playing more and more important roles in communications environmental protection during the phases of project plan, design, construction, and operation. Comprehensive technologies are involved in the use of UAVs, such as obtaining photos and videos through flying, establishing 3D landform and culture feature models, and measuring with geographic information software. The purpose is to analyze the rationality of route and site location from the environmental perspective, to identify environmental impact, to make environmental protection suggestions, and to calculate engineering quantities. In the future, more professional UAV systems are to be developed. Further research and application will be seen concerning big data and cloud data, and intelligent communications on the basis of UAV digital models, so as to serve the environmental protection of communications infrastructure both in China and in the “Belt and Road” (the Silk Road Economic Belt and the 21st-Century Maritime Silk Road).

Keywords: UAS, Unmanned Aircraft System, Transport, Environment Protection, Environment supervision, conservation of water and soil
考虑区域环境约束的城市交通网络收费设计问题研究

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摘 要：交通拥堵和尾气排放环境问题是城市交通可持续发展面临的主要问题。为了缓解城市交通拥堵和机动车尾气排放环境问题，本文以区域污染物排放限制为约束条件，以路网总排放量最低为优化目标，建立了考虑区域环境约束的城市交通网络收费的双层规划模型。通过考虑出行者的广义出行成本，以高峰时段固定需求下的用户均衡模型为双层规划模型的下层优化模型，进而分析道路收费条件下出行者的路径选择行为和交通流量分布的情况。并根据所建立的模型设计了相应的求解算法，而后应用简化的路网验证所提出的模型和算法的可行性。分析结果表明，在城市交通网络收费设计中，区域交通排放管控、网络总排放及系统总出行成本是需要进行权衡的三个目标。

关键词：交通拥堵；尾气排放；区域环境约束；道路收费

中图分类号：U238

Study on Urban Traffic Network Toll Design Problem with Regional Environmental Constraints

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Abstract: Urban transportation sustainable development is facing traffic congestion and exhaust emission pollution problems. In order to relieve traffic congestion and vehicular emission, the bi-level programming model considering regional environmental constraints was established. And the optimization goal is the lowest network emission. Based on drivers’ generalized travel cost, the user equilibrium model with fixed demand during peak hours was used as the lower optimization model of bi-level programming model. Subsequently, drivers’ route choice behavior and traffic flow distribution
can be analyzed under different road tolls. In accordance with the model established, the specific solution algorithm was designed. The model was used to simplified traffic network example to validate the feasibility of the model and algorithm. The results showed that urban traffic network toll design have to tradeoff among the regional emission mitigation, total network pollution emission and total system cost.

**Keywords:** traffic congestion; exhaust emission; regional environmental constraints; road toll

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Prediction of Potential Accidents in Mountain Highway Based on Rough Set and Quantitative Theory

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ABSTRACT
In order to effectively extract the traffic safety impact factors from the mountainous area of the ordinary arterial highway, and improve the accuracy and operability on accidents forecasting, the prediction model of potential accident was established based on the first theory of quantification. Rough set theory with attributes reduction algorithms is adopted to build the forecasting index system in this model. Theory and example analysis results show that rough set reduction algorithm can effectively simplify the complex traffic system of quantitative indicators and uncertain, imprecise subjective indexes under key information withheld; Accidents forecasting model based on the first theory of quantification with the following characteristics: the qualitative and quantitative variables are
fully considered, identify risk of road effectively, simplify operation, small amount of calculation, high accuracy.

**Keywords:** traffic engineering; rough set; reduction algorithms; the first theory of quantification; prediction of potential accidents
TGAM脑波模块的驾驶状态检测与预警系统设计

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摘  要：基于TGAM脑波模块，设计并实现了驾驶状态检测与预警系统。该系统利用TGAM脑波模块实时采集驾驶员脑电波，利用蓝牙完成脑电数据的传输。采用模拟驾驶实验检测不同驾驶状态下的脑波数据，并由此建立基于eSense指数和层次分析法（AHP）的数学模型。采用AT89C51单片机对算法进行程序实现并控制RGB灯珠进行灯光预警。该系统能够准确检测驾驶员紧张驾驶状态，轻度疲劳驾驶状态和重度疲劳驾驶状态并进行不同颜色的灯光预警，能够极大地避免司机在不良精神状态下驾驶，减少交通事故。

关键词：安全驾驶；状态检测；eSense指数；TGAM脑波模块风险评估

中图分类号: U492.8+4

Abstract: This paper is based on Think Gear ASIC Module, designing a driving state detecting and warning system. The system used Think Gear ASIC Module to collect the electroencephalogram (EEG) data for drivers in real time, and used Bluetooth wireless technology to pass data to single ship microcomputer. The EEG data in different driving states were investigated by using a driving simulation experiment. Then the article built mathematical models which were based on eSense index and analytic hierarchy process (AHP) to analyze the data. Taking AT89C51 single ship microcomputer to implement algorithm and control RGB lamps. This system accurately detected and distinguished
the bad mental state of the driver, and sent out warning by different color lights. It can ensure that the
driver has a good mental state, and has a good effect on eliminating traffic accidents.

**Keywords:** Driving safety; Condition monitoring; eSense index; Think Gear ASIC Module

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Identification of Traffic Crash Hotspots Using Network Kernel Density Estimation Method

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ABSTRACT

Spatial analysis methods help to quickly identify hot spots of traffic crashes and make it visualized to managers. Compared to planar kernel density estimation (KDE), the network constrained KDE is more appropriate for charactering certain point events occur inside 1-D linear space. Hence, this paper uses network KDE approach to identifying hazardous locations from road network. The approach is implemented in the ESRI ArcGIS environment by installing a plug-in tool called SANET. And it is tested with the traffic crash data of year 2016 and a freeway network in Guangzhou area, China. The different density maps computed with planar KDE and network KDE are compared. It indicates that the latter is more appropriate to identify hot spots on the freeway network, since the former covers planar space instead of linear space and is likely to underestimate the density values. This study also examines the impacts of linear unit length and search bandwidth on network KDE. It is found that shorter length of linear unit shows much more local details of variation in the density values. The search bandwidth controls the smoothness of the spatial pattern, and with increasing bandwidth the density surface gets smoother. Finally,
the hot spots on freeway network are selected out by defining a density threshold, and a three-dimensional scene of hot spots is built to intuitively present the locations of hot spots.

**Keywords:** traffic crashes, hot spots, network-constrained, kernel density estimation
Abstract

This paper explores the vehicle-bicycle crash data in order to identify the driving states (wheeling or riding a bicycle) of bicyclists. An automated support method was developed to help
the police or the court to make a responsibility judgment instead of the artificial method. The basic information of the vehicle damage, the bicycle damage and the human injury in 127 forensic appraisal cases were collected in a city of China from 2010 to 2012. Through Correlation Analysis (CA) method, the correlation parameters were extracted. Then different ways of Linear Discriminant Analysis (LDA) were adopted to get the best discriminant function and the key parameters by SPSS Statistics 21. To avoid the deficiencies of the linear methods, more nonlinear methods were analyzed and compared by using the auto-classifier of SPSS Modeler15.0. Finally, Artificial Neural Network (ANN) had the highest classification accuracy (76.32%) compared to the LDA (71.7%) and other nonlinear methods. The result shows the important variables are all Bicycle Saddle Damage (BSD) and Bicycle Saddle Rotation (BSR) both by linear and nonlinear methods. The parameters derived from the trained ANN could be used to evaluate the cyclist’s behavior of another cases. It could be used as a complementary method to get the correct verdict from different perspectives.

**Keywords:** traffic accidents; forensic appraisal; discriminant analysis; Artificial Neural Network (ANN)
基于TTI法的城市道路拥堵评价研究

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摘 要：本文通过选取南京G205（凤台南路）上的车流量数据来分析此路段的交通信息。主要通过分析不同时间段对车辆速度、行驶时间指数（TTI）、载客率以及交通量的影响来获得不同时间段对交通的影响。以上结果有效地反映了路网拥堵变化的实际情况，为交通决策及揭示交通运行变化规律提供了有力手段。

关键词：TTI，交通拥堵，道路交通，拥堵评价

Research on Urban Traffic Congestion Based on the TTI Method

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Abstract: This paper analyzed the traffic information of the road by collecting the traffic flow data of Nanjing G205 (Fengtai South Road). The influence of traffic time on traffic speed, TTI, load factor and traffic volume were analyzed. The above results effectively reflect the actual situation of road network congestion change, and provide a powerful means for traffic decision-making and revealing the change law of traffic operation.

Keyword: TTI; Traffic congestion; Network traffic, congestion evaluation

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地铁四号线运行振动对南京鼓楼的影响研究

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摘 要: 以南京地铁四号线运营对鼓楼的振动影响为背景, 采用三维有限元动力模型, 结合路面交通引起的环境振动, 研究地铁四号线运行振动作用下鼓楼的动力响应规律。将监测值与理论计算值进行对比, 参照相关的国家标准评估鼓楼的振动响应情况, 所得结果可为鼓楼后期的加固、修缮提供参考和建议。

关键词: 地铁四号线; 鼓楼; 环境振动; 加固

中图法分类号: TU311.3; 文献标志码: A

Influence Study of Nanjing Drum Tower under the Situation of Metro Line Four Running

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Abstract: Based on the vibration impact predictions on Nanjing Drum Tower by Metro Line 4, the regularities of dynamic response are studied by three–dimensional finite element mode, combining with the environment vibration caused by ground traffic. Comparing the results between monitor and calculation and evaluating the vibration response of the Drum Tower based on the relevant national standards. The results can provide reference and suggestions for the later reinforcement and reparation.

Keywords: metro train line 4; the Drum Tower; the environment vibration; reinforcement

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朱利明（1968–），南京工业大学，教授级高工，主要研究方向：桥梁隧道及轨道交通结构设计、鉴定、评估及维修加固改造技术、振动控制技术及耐久性研究等。联系电话：13851812371，电子邮箱：Zhuliming@njtech.edu.cn。
城市街道机动车排放污染物扩散规律研究

马鑫旺，魏中华

摘 要：近年来，北京市雾霾频发成为了公众越来越关心的环境问题。造成这一现象的原因有很多，但是由机动车排放物造成的污染是一个不可忽视的方面。相对于机动车驾驶员来说，自行车骑行者和行人首当其冲的受到污染物的危害。为了研究PM2.5的横向扩散的对周围周边环境的影响，本文使用PM2.5手持测量仪器，选择在适当的条件下，在北京市几条典型道路的横断面上取点，测量每个点的PM2.5浓度的值，对污染物横向扩散规律进行研究，通过处理得出PM2.5浓度变化曲线，对不同条件下得到的曲线进行对比分析，发现在拥堵条件下，PM2.5浓度呈现出机动车道中央高，并向道路两侧逐渐降低的趋势；而在车辆行驶顺畅时，其浓度变化呈现出机动车道中央低，而机非车道交界处浓度高，在自行车道附近则又降低的趋势。基于扩散规律，我们对自行车线到干道的距离进行分析，并认为需要改进。这个研究结果将用于估计PM2.5对自行车骑行者和行人的影响，并协助有关机构采取合理的对策，提高基础设施，如改善主干道与自行车道、人行道的距离。

关键词：PM2.5；城市交通；雾霾天气；

Study on the Diffusion of Pollutants in Urban Street

Ma Xin-wang, Wei Zhong-hua

Abstract: In recent years, the haunting haze whether in Beijing has become a serious environmental problem, which has largely attracted public’s attention. The reasons for this phenomenon are various, but the pollutants from the vehicles emissions, especially particle matter (PM) 2.5, are a primary origin, which make bicyclists and pedestrians inhale hazardous particles. In order to investigate the impact of lateral diffusion of PM2.5 on peripheral surrounding environment, the roads around a residential area in Beijing are selected. Typical street cross sections are picked to collect the concentrations of PM2.5 by detectors in appropriate conditions. The PM2.5 concentration change curve are compared to analyze the diffusion regularity in different conditions. It is concluded that, in traffic congestion, the concentration of PM2.5 in middle of the road is higher than that in roadsides; on the country, in
free flow condition, the concentration of PM2.5 in roadside is higher than that in middle of road, and decreasing near the bicycle lines. Based on the diffusion regularity, the installment of the bicycle line distance to the arterials are analyzed and considered to be improved. Findings from this research will estimate the effect on bicyclists and pedestrians and assist relevant agencies in taking reasonable countermeasures to improve the installment of infrastructures, such as improve the bicycle line and pavement distance to the arterials.

**Keywords:** diffusion of PM2.5; urban traffic; haze whether.

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山区公路夜间行车安全提升技术研究

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摘 要：针对山区公路典型类型的事故高发路段，进行驾驶风险分析。引入贝叶斯风险分析理论，将环境和路段等类型的影响因素设置为变量，从而将事故模型数值化。基于K2结构学习法，得到山区公路夜间驾驶风险分析贝叶斯网络结构。相对对于白天的环境条件，发生事故的情况较少；反之，若处于夜间的环境条件下，更有可能频繁发生事故。采用山区公路夜间行车安全提升体系专利技术，有效解决了夜间行车因视觉因素带来的视野窄、视距短、视线诱导差等状况，提高夜间行车安全。该技术环保节约。

关键词：山区公路；夜间驾驶；安全

中图分类号：U491.3

Study on the Technology of Raising the Safety of Mountain Road

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Abstract: The driving risk analysis is carried out for the night driving at mountain road. Traffic accident risks along different part of mountain road, such as the curve alignment, straight alignment, and nearby the road sections when passing through villages or a guardrail, were analyzed respectively. The Bayesian risk analysis theory is introduced, and the influence factors such as environment and road sections are set as variables. Based on the K2 structure learning method, the risk network structure of night driving at mountain road is obtained. It is found that there are fewer accidents in daytime, and on the other hand, it is more likely to occur frequently in the night environment. The patented technology of mountain road safety and upgrading system in mountainous area is used to solve the problem of narrow vision, short line of sight and the poor sight line induction in the nighttime. This technology
improves nighttime traffic safety and is environmentally friendly.

**Keywords:** mountain road; night driving; safety
城乡结合部一级公路接入口评价研究

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摘 要：针对当前一级公路接入口运行效率和交通安全问题，选择三种典型接入口形式开展评价研究。分别采用VISSIM仿真软件和SSAM交通冲突仿真模型，建立交通流仿真模型。分别采集行程时间、延误、停车数、交通冲突数和交通冲突时间等指标，比较了各接入口形式下的交通效率和交通冲突强度，得到了安全效率最高的接入口形式。

关键词：城乡结合部一级公路接入口 右进右出 VISSIM仿真 安全间接分析模型（SSAM）

中图分类号：U491

Evaluation of Efficiency and Safety at Access of the First-grade Highway

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Abstract: Aiming at the operation efficiency and traffic safety problem of the current highway access, three kinds of typical access are selected for evaluation research. The simulation model of traffic flow is established by using VISSIM simulation software and SSAM (Surrogate Safety Assessment Model) respectively. In order to obtain the highest safety and the most efficient form of access, the travel time, delay, parking number, traffic conflict number and traffic conflict time were collected, then the traffic efficiency and the intensity of the traffic conflict in each access were compared.

Keywords: Suburban First-grade Highway; Access; Right-in and Right-out; VISSIM Simulation; Surrogate Safety Assessment Model (SSAM)
Accident Prediction for Highway-Rail Grade Crossings: a Model
Comparison of Decision Tree and Neural Network

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ABSTRACT

Highway-rail grade crossings (HRGCs) are essential spatial locations which are critically important for transportation system. Traffic accidents at those locations are often catastrophic, moreover, the economic impact of those accidents are often extended due to traffic delay on both highway and railway. Thus, an accurate HRGC accident prediction model is a critical element for HRGC safety improvement decision making. Compared to commonly adopt statistical models, data mining models are widely accepted in various areas because of their advanced abilities to calculate with large datasets and handle missing values, plus, data mining models have no pre-assumption of underlying relationships between target variables and predictors like most of statistical models do.
Decision Tree and Neural Network models are the two most commonly accepted prediction models in many disciplines. However, there is no clear model selection guidance to assist decision makers for the purpose of predicting HRGC crash rate and/or exploring contributory factors. In this research, the two types of models were tested with historical HRGCs’ crash data of North Dakota State from 1996 to 2014. Several interesting findings were observed 1) Decision flow chart developed by Decision Tree model is straightforward to understand and interpret. 2) Contributory factors and their importance levels identified by Decision Tree model are intuitive and agreed with previous research results. 3) Neural Network model shows greatly improved predicting accuracy: 85.6% and 84.9% for training and testing data set respectively, compared with the predicting accuracies of 77.2% and 76.3% in Decision Tree model. 4) Neural Network results in a neuron-based network containing results from a black box which are challenging to understand and interpret. 5) Contributory factors identified by Neural Network model based on mean-square-error-based algorithms are proved to be more intuitive than connection-weight-based algorithms.

**Keywords:** Highway-rail Grade Crossing, Data Mining, Decision Tree, Neural Network, Crash
典型山区高速公路建设能耗分析研究——以河南省三淅高速卢氏至寺湾段为例

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摘 要：为深入了解公路建设过程能源消耗情况，依托交通运输部绿色公路试点河南三淅高速，通过逐月采集公路建设主要材料和能源消耗信息，通过统计分析，得出三淅高速公路原材料生产和现场施工两个阶段的路基、路面、桥涵和隧道不同工程能耗情况。研究表明，三淅高速公路主体工程建设总能耗为1026639.1 tce，其中原材料生产能耗占88.9%，现场施工能耗占11.1%，单位里程能耗水平由大到小依次为桥涵工程（14588.6 tce/km）> 隧道工程（9429.5 tce/km）> 路基工程（1976.3 tce/km）> 路面工程（344.5 tce/km）。在施工阶段路基、桥涵、隧道和路面工程施工能耗占比分别为33.1%、32.0%、25.2%和9.7%，单位里程施工能耗分别为743.5 tce/km、808.5 tce/km、1183.2 tce/km和90.3 tce/km，并据此从节材、节能、施工管理等角度提出了公路建设的节能减排措施建议。

关键词：高速公路；生命周期评价；能源消耗；节能措施

中图分类号：U41

Analysis of Energy Consumption of Mountainous Area Expressway Construction

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Abstract: In order to understand energy consumption during expressway construction. This study calculate the energy consumption from different steps of construction process (raw material production and onsite construction) of different project types (subgrade, bridge, tunnels and pavement) based on the raw material and energy statistical tables submitted by all construction units month by month during
construction period. The energy consumption's components are analyzed in detail. The results indicate that the total energy consumption is 1026639.1 tce, mainly comes from raw material production stage, accounting for 88.8%. The onsite construction stage accounts for 11.2%. As for the total energy consumption levels of unit quantity in different engineering types. The total energy consumption from bridge, tunnel, road and pavement constructions was 14588.6 tce/km, 9429.5 tce/km, 1976.3 tce/km, 344.5 tce/km, respectively. In onsite construction stage, the energy consumption of bridge, tunnels, subgrade, pavement account for 33.1%, 32.0%, 25.2% and 9.7%, respectively, and energy consumption levels of unit quantity are 743.5 tce/km, 808.5 tce/km, 1183.2 tce/km and 90.3 tce/km, respectively. Also, a series of energy-saving measures are proposed from the perspective of material-saving, energy-saving and management-strengthen.

Keywords: expressway; life cycle assessment; energy consumption; energy-saving measures

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Safety Effectiveness Evaluation of Transverse Rumble Strips on Approaches to High-speed Intersections in Alabama

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ABSTRACT

The objectives of this study were to determine whether the presence of transverse rumble strips (TRS) when approaching high-speed intersections in rural areas was an effective warning device in traffic crash reduction and to examine if TRS installed before or after dilemma zone will have different safety implications. Signal timing and intersection width were measured at eight high-speed intersections on US 280 in Alabama that were used for dilemma zone analysis, four of these, with valid crash data, were used for the safety effectiveness evaluation. Crash data was also collected, identified, and analyzed to evaluate the effectiveness of encountering TRS on intersection approaches when taking dilemma zone into consideration. This crash-based evaluation, which served as an indication of safety effectiveness, was further discussed through crash pattern analysis. The results revealed TRS installed too close to the intersection (within the dilemma zone) will have a negative impact on traffic safety. Crash data analysis indicated that TRS may produce an increase in total crashes due to the increase of Property Damage Only (PDO) crashes but a decrease in injury crashes, which are all significant at 95% confidence level. The crash pattern analysis was performed to find the
contributing factors causing the crashes before and after installation of TRS including the statistical analysis. Failure to yield the right-of-way (safety effectiveness index: 2.768) is more significant than the contributing factor following too close (1.717). As for the crash type, both the side-swipe (6.209) and rear-end (3.028) crashes are statistically significant.

**Keywords:** Highway Safety, High-Speed Intersection, Transverse Rumble Strips (TRS), Dilemma Zone
基于光谱特征分析的道路结冰监测模型

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摘 要：针对目前道路结冰监测的难题，拟采用遥感技术解决道路结冰问题，本论文利用光谱仪和环境试验箱，模拟了不同道路面（沥青、水泥、大理石）结冰的情况，对不同道路面进行了光谱测量，并对目前应用最广泛的监测冰雪的冰雪指数NDSI进行了分析，在此基础上构建了新的道路结冰监测模型RII，主要的结论如下：道路结冰时的光谱特征受路面自身的光谱影响较大；与雪、海冰的光谱特征都有较大的差异；目前应用广泛的冰雪监测指数NDSI不适合道路结冰的监测；基于道路结冰的光谱特征分析，构建了新的道路结冰监测指数RII，能满足道路结冰监测的需要。本监测指数是基于实验分析构建的新的模型，仍需要大量的遥感数据进行验证和推广。

关键词：光谱特征，道路结冰，监测

中图分类号：U41

Road Ice Monitoring Model Based on Spectral Feature Analysis

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Abstract: In view of the existing problems of road icing monitoring, remote sensing technology is proposed to solve the problem. In this paper, we used the spectrometer and environmental test box to simulate the freezing of different road surfaces (asphalt, cement and marble), and analyzed the NDSI, which is the most extensive monitoring model on monitoring snow and ice. On this basis, a new road icing monitoring model RII is constructed. The main conclusions are as follows: the spectral characteristics of road icing has a large difference with the spectrum of snow and sea ice; the current
snow and ice monitoring index NDSI is not suitable for road icing monitoring; based on the analysis of road icing spectral analysis, we proposed a new road icing monitoring index RII, it can meet the needs of road icing monitoring. The monitoring index is a new model, based on the experimental analysis, and it still need a lot of remote sensing data for verification and promotion.

**Keywords:** multispectral, road icing, monitoring
TGAM脑波模块的驾驶状态检测与预警系统设计

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摘 要: 基于TGAM脑波模块，设计并实现了驾驶状态检测与预警系统。该系统利用TGAM脑波模块实时采集驾驶员脑电波，利用蓝牙完成脑电数据的传输。采用模拟驾驶实验检测不同驾驶状态下的脑波数据，并由此建立基于eSense指数和层次分析法（AHP）的数学模型。采用AT89C51单片机对算法进行程序实现并控制RGB灯珠进行灯光预警。该系统能够准确检测驾驶员紧张驾驶状态，轻度疲劳驾驶状态和重度疲劳驾驶状态并进行不同颜色的灯光预警，能够极大地避免司机在不良精神状态下驾驶，减少交通事故。

关键词: 安全驾驶; 状态检测; eSense指数; TGAM脑波模块风险评估

中图分类号: U492.8+4

Driving State Detecting and Warning System Based on Think Gear ASIC Module

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Abstract: This paper is based on Think Gear ASIC Module, designing a driving state detecting and warning system. The system used Think Gear ASIC Module to collect the electroencephalogram (EEG) data for drivers in real time, and used Bluetooth wireless technology to pass data to single ship microcomputer. The EEG data in different driving states were investigated by using a driving simulation experiment. Then the article built mathematical models which were based on eSense index and analytic hierarchy process (AHP) to analyze the data. Taking AT89C51 single ship microcomputer to implement algorithm and control RGB lamps. This system accurately detected and distinguished the bad mental state of the driver, and sent out warning by different color lights. It can ensure that the
driver has a good mental state, and has a good effect on eliminating traffic accidents.

**Keywords:** Driving safety; Condition monitoring; eSense index; Think Gear ASIC Module

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高速公路出口免费通行排队长度阈值的综合效益分析

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摘 要：利用GPS装备和车载诊断系统OBD-Ⅱ对实验车辆在高速公路收费站人工收费车道处的运行数据进行采集和分析。借助传统的VSP Bin方法对车辆的排队数据进行排放计算统计，建立人工收费车道车辆排队长度和车辆排放速率的预测模型，通过与实测数据的对比表明模型能够很好的预测车辆排队期间的排放速率。根据道路使用者的社会成本增加量与车辆位置之间的关系，以收费站平均收费水平作为比较标准，确定最佳的免费放行队长。

关键词：收费站; 尾气排放; 最佳放行队长

Comprehensive Benefit Analysis of Length Threshold of Free Passing Line at Expressway Export

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Abstract: Analyzing the trajectory data of test vehicle though the highway toll station, which were collected by GPS equipment and vehicle diagnostic system OBD-Ⅱ. The traditional VSP Bin method was used to calculate the vehicle queued data, and prediction model of queue length and vehicle emission rate is established. It is shown that the model can be used to predict the emission rate well by comparing with the actual measured data. According to the relationship between the increase in the social cost of the road user and the vehicle location, we can find the optimal release length of queue as well the average charge level of toll station was taken as the comparison standard.

Keywords: toll station; emission model; optimal release length of queue
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新建高速公路事故黑点鉴别研究

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摘 要：近年来我国正处在高速公路的快速发展时期，针对新建高速公路事故数据较少的实际情况，为了更好的鉴别新建高速公路事故黑点，本文提出将聚类分析与事故频数法相结合，建立新建高速公路事故黑点鉴别方法体系，并根据现有事故数据对洛栾高速事故黑点进行鉴别，为下一步洛栾高速的交通设施优化提供相关依据，同时为降低我国其他新建高速公路事故率提供新的思路。

关键词：事故黑点；新建高速公路；聚类分析；事故频数

Research on the Accident Black-spot Identification of New Expressway

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Abstract: In recent years, China is in a period of rapid development of the expressway. In order to better identify the accident black-spots of new expressway with the actual accident data of the new expressway, the combination of cluster analysis and accident frequency method is put forward and a new method to identify the accident black-spots of the expressway is established in this paper. And this paper has identified the accident black-spots of Luoluan expressway based on the existing accident data. This paper also has provided the basis for the optimization of traffic facilities of Luoluan expressway. At the same time, this paper has provided new
ideas to reduce the accident rate of other new expressway in our country.

Keywords: accident black-spot; new expressway; cluster analysis; accident frequency

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山区高速公路连续弯坡段自由流状态下事故分析及车速保障措施研究

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摘要：从平曲线半径、车速、天气类型三方面，对山区高速公路连续弯坡段自由流状态下的事故特征进行分析，并与一般弯坡段的事故规律进行比较，得出山区高速公路连续弯坡段自由流状态下的事故主要影响因素。根据比较结果，提出自由流状态下连续弯坡段的车速保障措施，为山区高速公路连续弯坡段的行车安全提供参考。

关键词：连续弯坡段；事故特征；车速保障措施

Accident Analysis and Research on Vehicle Speed Guarantee Measures of Continuous Carved Section of Mountain Expressway in the Free Flow State

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Abstract: Considering from the radius of horizontal carve, speed, weather types, the accident characteristics of continuous carved section of mountain expressway in the free flow state are analyzed, and comparing with the accident characteristics of general carved section to find the major factors of the accidents which happen in continuous carved section of mountain expressway in the free flow state. According to the comparing result, vehicle speed guarantee measures are proposed, which provides reference for the safe travel in continuous carved section of mountain expressway in the free flow state.

Key words: continuous carved section; accident characteristics; vehicle speed guarantee measures
Experimental Study of a New Warning Facility at Unsignalized Intersections

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ABSTRACT

In order to improve traffic capacity and driving safety at unsignalized intersections, this paper proposed a new warning facility. By investigating the actual traffic environment at the village road in Miyun, a county in Beijing, we built a simulation model of emergency collision avoidance at intersections without signals. We compared the vehicle operation status under different warning facilities, in order to analyze the effectiveness of the new warning facility. We analyzed the driver’s vehicle speed data in front of the intersection through the method of K-means Clustering and variance analysis with repeated measures. The results revealed that when a vehicle rushes through the intersection ahead, setting the traffic sensor warning light can make the driver take deceleration measures in advance, which could effectively avoid the speed mutation phenomenon, and significantly improve the driving stability.

Keywords: Driving behavior; Analysis of variance; Driving simulation; Warning facilities; Unsignalized intersection.
基于计划行为理论的大学生闯红灯行为决策模型

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摘 要：根据我国道路交通环境特征，选择大学生作为研究对象，应用计划行为理论对闯红灯的现象进行行性决策建模。首先，根据车流量、道路宽度和有无中央安全岛将行人过街环境分为六类情境；其次，在计划行为理论模型的基础上增加行为经验这一变量，并且分别在每一情境下应用计划行为理论进行问卷设计；再次，调查广州某高校的在校大学生，总共回收有效问卷376份，回收率为91.75%，数据分析表明，调查得到的数据具有良好的信度和效度，各项目的内部一致性良好且数据可靠性高。最后，建立结构方程模型（SEM）对六类情境的数据进行分析，得到六个大学生闯红灯行为的结构方程模型。结果表明，大学生对闯红灯的态度和增加的行为经验，与行为意向没有显著相关性，而主观规范和知觉行为控制则与行为意向显著相关。并且知觉行为控制是个强大的预测因子，能预测行为意向，还可以直接作用于实际行为。

关键词：大学生；闯红灯；交通安全；计划行为理论；结构方程

中图分类号：U121

A Decision Making Model of College Students' Red Light Behavior Based on the Theory of Planned Behavior

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Abstract: According to the characteristics of the road traffic environment in China, this paper selects the college students as the research object and applies the theory of planned behavior to the modeling of the phenomenon of red light running. First of all, according to the traffic flow, road width and a central island, the pedestrian environment is divided into six kinds of situations; Secondly, on the basis of the theory of planned behavior, the behavior experience is added to this variable, and the questionnaire...
is designed by using the theory of planned behavior in each situation; thirdly, a survey of Guangzhou College Students University, a total of 376 valid questionnaires were recovered, the recovery rate is 91.75%, the data analysis shows that the survey datas obtained have a good reliability and validity. The internal consistency of each project is good and the data reliability is high. Finally, the structural equation model (SEM) was used to analyze the datas of six kinds of situations, and the structural equation model of the red light behavior of six college students was obtained. The results showed that there was no significant correlation between College Students' attitude toward red light and their new behavior, but the subjective norm and perceived behavioral control were significantly correlated with behavioral intention. And perceived behavioral control is a powerful predictor, which can predict behavioral intention, and can directly act on actual behavior.

**Keywords:** college students; red traffic lights; traffic safety; theory of planned behavior; structural equation
Relationship between Median Widths and Wrong-way Incidents on Multilane Divided Highways

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ABSTRACT

This paper describes the relationship between wrong-way driving (WWD) incidents and median widths and discusses the effects of varying median widths on WWD occurrences on multilane divided highways. To analyze the relationship between median widths and wrong-way crashes on multilane divided highways, two types of data were collected: crash data on divided highways with varying median widths and field review data at identified WWD entry points in Alabama. A two-step analysis approach was used: 1) analyzing the correlation between median widths and WWD crash occurrences; and 2) analyzing field data to determine effects of median widths on driver sight distance on crossroads, a critical factor for safety at the divided highway-crossroad intersections. Detailed relationships were identified between median widths and wrong-way incidents by statistical analyses. A method to determine sight distance sufficiency was developed based on median widths and grade changes to deter wrong-way movements on divided highways. Conclusions can guide traffic agencies for examining median-crossroad intersections and installing wrong-way traffic control devices (TCDs) based on median widths and grade changes to reduce wrong-way incidents on multilane divided highways.

Keywords: Multilane Divided Highways; Median Widths; Wrong-Way Incidents; Sight Distance; Relationship


Driving Behavior Analysis along Bridge-tunnel Transition Section in Reduced Visibility Situation

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ABSTRACT

Adverse weather, especially fog, results in lots of fatal accidents. According to ministry of transport (MOT) of china, over 50% of traffic accidents happened in reduced visibility condition. To solve this problem, many previous studies focused on driving behavior and road safety. However, the relationship between weather parameters and safety is not clear. This paper presents a comprehensive investigation of driving safety along bridge-tunnel transition section (BTCs) under adverse visibility condition. Data collected from driving simulator and eye tracker were used and an ordered logistic model was established. The result shows that: (1) visibility significantly affected driver’s speed choice
while traffic setting plan was not. (2) Driving in light fog made driver incautious due to relatively good driving condition and overestimation of safety status. (3) Danger was more likely to happen when driver did not follow traffic sign and changed lane late in heavy fog.

**Keywords:** driving simulator, driving behavior, reduced visibility condition, eye movement, safety evaluation
Early Warning System of Operation Risk of Bridge-tunnel Transition Section

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ABSTRACT

According to the operation risk analysis of traffic environment and meteorological environment on bridge-tunnel transition section combined with related research results, the safety control standard and the core early warning model were formulated. Then, layout method for information collection and release facilities was proposed. The early warning system of operation risk on bridge-tunnel transition section was established. The system was composed of risk information collection, data management and analysis, risk early warning, decision support of traffic safety management, information release and other subsystems, which can realize traffic risk control, traffic flow coordination and emergency treatment.

Key words: bridge-tunnel; transition section; operation risk; early warning system; risk control
Investigating Rollover of Six-axle Tractor-semitrailer on Combined Horizontal and Vertical Expressway Segments by Simulation

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ABSTRACT
In this paper, the rollover mechanism of six-axle tractor-semitrailer on combined horizontal and vertical expressway segments was investigated. Controlled variable scenarios were developed by TruckSim, to simulate the influence of road geometry and speeds on the heavy trucks rollover. Lateral
acceleration was selected as the indicator to measure the risk of rollover. The significance of each factor was analysed based on the multi-factor analysis of variance. The regression models of lateral acceleration for tractor and semitrailer were calibrated by SPSS software. Based on the critical stable state of the vehicle, the risks of six-axle tractor-semitrailer on curved upgrades and downgrades were analysed. The results showed that, the horizontal curve radius and the speed have significant effects on the accelerations of tractor and semitrailer, only on the downgrades, grade has significant effect on the lateral acceleration of semitrailer. The six-axle tractor-semitrailer can operate in a stable state at 80km/h on the horizontal curves radius of 250m, with the vertical slope of 6% and -6%. Research results can provide the technical support for a more reasonable safety evaluation method for the six-axle tractor-semitrailer on combined horizontal and vertical expressway segments.

**Keywords:** highway safety; rollover; TruckSim simulation; six-axle tractor-semitrailer; combined horizontal and vertical expressway segment
Investigation of Confounding Factors Contributing to Wrong-Way Driving Crashes on Divided Highways

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ABSTRACT

This study focuses on differentiating the confounding factors that contribute to wrong-way driving (WWD) crashes from other type of crashes on Alabama divided highways by performing statistical analysis. Crash data from 2009 to 2013, including 112 verified WWD crashes, are compared with 49,599 other type of crashes on the same class of roads during the same period. A simple descriptive data analysis was conducted to identify different explanatory variables contributing to WWD crashes. The results illustrated characteristics of a WWD crash, including crash severity, temporal distribution, driver characteristics, vehicle characteristics, and environmental conditions. In addition, the Firth’s penalized-likelihood logistic regression model was used to identify the statistically
significant contributing factors. Odds ratios (OR) of different variables were calculated to measure how each factor affected WWD crashes when compared with other types of crashes. The results show that wrong-way (WW) drivers are more likely to be older and driving under influence (DUI). Furthermore, WWD crashes were found to be more prevalent in urban areas and dark road conditions. Dark roadways with no lighting conditions were found to have the largest OR. To complement the analysis, the contributing factors of those fatal WWD crashes also were investigated. Finally, several countermeasures for reducing WWD crashes on the studied facilities are discussed based on the data analysis results.

**Keywords:** wrong-way driving (WWD), divided highways, contributing factors, logistic regression analysis, penalized-likelihood
一种危险货物运输方式决策方法

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摘 要: 危险货物在实施异地运输时，存在多种运输方式可供选择。本文考虑决策者心理行为，综合运用粗糙集理论、灰靶理论和前景理论，解决了危险货物运输方式选择问题。首先，通过粗糙集理论构建了危险货物运输方式决策指标体系，然后将灰靶思想与前景理论相结合，综合考虑每一个决策者对各个选择评价指标的期望灰靶值以及决策者关于指标值是否落入灰靶内的风险态度，确定了决策者的权重及前景价值函数值，基于综合前景值对危险货物运输方式进行选择。最后，通过一个例子验证了该方法的可行性和有效性。

关键词: 危险货物; 运输方式; 粗糙集; 前景理论; 灰靶

A Transportation Mode Decision-making Method for Hazardous Materials

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Abstract: Hazardous materials on the long-distance transportation tend to have a variety of choices to select transportation mode. This paper analyses the psychological behavior of policy makers, and the integrated use of rough set theory, grey target theory and prospect theory, to solve the problem of the choice of hazardous materials’ transportation mode. First, building the index system of hazardous materials transportation decision-making by the rough set theory, then combining grey target thought and prospect theory to consider each policy maker’s expectation of each choose on the evaluation index of grey target values, and the risk attitude of policymakers about whether the index falling into the grey target, to determine the weights of decision makers and the prospect value function value, and to choose the transportation mode on comprehensive prospect value of hazardous materials. Finally, it verifies the feasibility and validity of the method.
through an example.

**Keywords:** Hazardous Materials; Transportation Way; Prospects Theory; Grey Target

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基于交通冲突的城乡结合部干线公路交通安全评价方法

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摘 要：城乡结合部干线公路路段为典型混合交通环境，道路交通环境及车辆组成复杂，导致交通冲突严重，交通事故多发。本文基于路段交通冲突技术，结合现场调查数据，利用Logistic回归模型构建路段交通冲突等级的预测模型，分析各类交通冲突和相关影响因素之间的关系，并验证了模型的可靠性；并提出基于交通冲突风险等级预测的路段交通安全评估方法。本文研究成果可为城乡结合部干线公路的交通安全评估提供替代方法。

关键词：交通安全；城乡结合部干线公路；路段交通冲突；安全评价

Traffic Safety Evaluation Method of Arterial Highway in Suburban Areas

Based on Traffic Conflicts

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Abstract: The arterial highway in suburban areas, as the typical mixed traffic environment, produce more traffic collision and accidents than other highway segments due to the complex road environment and vehicle composition. Based on the traffic conflict technique and combining with field survey data, the prediction model of traffic conflict level was proposed through logistic regression method, and the model validation was conducted. The relationship between various traffic conflicts and related influencing factors was analyzed. Furthermore, the highway traffic safety assessment method based on traffic conflict risk level was presented. The results of this paper could provide an alternative method for the traffic safety assessment of arterial highway in suburban areas.
Keywords: traffic safety; arterial highway in suburban areas; traffic conflict; safety assessment

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The Changing of Driver’s Heart Rate and Heart Rate Variability at the Period of the Car Meeting Prairie Highway Landscape

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ABSTRACT
This study aims to explore the effects of prairie highway road environments on driver’s Heart Rate and Heart Rate Variability at the period of the car meeting. The characteristics of prairie highway include small longitudinal slope, large circular curve radius, long straight line and the tedious landscape, which easily make drivers feel a sense of monotony and mental fatigue. As a result, this phenomenon finally causes drivers’ slow response, low attention, error increasing of estimating speed and distance, and ability decrease of perception. If drivers drive the car several hours on the prairie highway, the accident may be happened. Especially, the accident may take place the period of the car meeting at high-speed. The five samples of driver who are different Temperament type are selected to drive at free speed (no over the limited speed) on 100 km typical prairie highway. ECG signals are collected with multi-channel physiological acquisition instrument at whole experiment, and the period of the car meeting are recorded on the ECG signals. Analyzing ECG signals, three results have been discovered. Firstly, the driver’s heart rate at the period of the car meeting is a little higher than
the mean of driver’s heart rate on the experimental road. The result possible means that the driver is nervous at the period of the car meeting. Secondly, the trend of driver’s heart rate plot at the period of the car meeting is same with the trend of mean driver’s heart rate. And the trend shows that the changes of the heart rate when the car meeting is caused by the increasing of the driving time. Thirdly, drivers will appear the mental fatigue with the driving time increasing at car meeting time in monotonous low-road environments. Conclusions: (1) The result possible means that the driver is nervous at the period of the car meeting. (2) The trend of driver’s heart rate plot at the period of the car meeting is same with the trend of mean driver’s heart rate. And the trend clears that the changes of the heart rate when the car meeting is caused by the increasing of the driving time. (3) The results reveal that the driving time, temperament possible can affect the mental fatigue, but they are not the unique factor. Fatigue is complex problem, we should research different factor to study it.

**Keywords:** prairie highway landscape; the period of the car meeting; driver’s heart rate; driver’s heart rate variability
考虑环境因素的智能运输系统中交通管控策略评价指标体系构建

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摘要：交通管控策略的选择直接制约和影响着城市交通运输的发展。在道路条件不易改善及车辆状况不易改变的前提下，通过合理的交通管控策略来改善道路安全，提高交通流运行效率及降低机动车排放，是一种经济可行的方法。以往对交通管控策略的评价集中于交通流运行效率上，而忽略了对交通安全和交通环境的影响。构建综合考虑交通安全、运行效率及交通环境的评价指标体系，采用层次分析法确定三个评价指标各层次的权重，从而为更准确的评价交通管控策略实施前后的效益提供理论支持。

关键词：交通管控策略；评价指标；指标体系；层次分析法

中图分类号：X946

Construction of Multi-objective Evaluation Index System of Traffic Management Strategy

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Abstract: How to choose traffic management strategy restricts and affects the development of the urban transportation directly. Under the premise of the Road and vehicles conditions are not easy to change, through the reasonable traffic management strategy to improve road safety, traffic efficiency and reduce vehicle emissions, is a kind of economic and feasible method. Former traffic management strategy’s evaluation focuses on the traffic efficiency, ignores the traffic safety and the influence of the traffic environment. Setting up an evaluation index system which contains road traffic safety index, efficiency index and traffic environmental index, using AHP to determine the each evaluation index weight for traffic control strategy, thus to provide theoretical support to evaluate the benefit of the traffic management strategy accurately.

Keywords: Traffic management strategy; evaluation index; the evaluation index system; AHP
基于贝叶斯网络的道路运输企业安全评价方法

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摘要：为了更准确地评价道路运输企业的安全水平以降低其事故风险，提出了一种基于贝叶斯网络的道路运输企业安全评价模型。在从某企业实际角度出发构建道路运输企业安全评价指标体系的基础上，利用贝叶斯网络的基本原理，详细地介绍了构建贝叶斯网络评价模型的基本步骤。通过对该道路运输企业安全性的实例评价，结果表明，此评价方法可以处理复杂的逻辑关系，能把专家的不同意见有效集结到最终的评价结果中，并可对企业安全系统进行前向的概率推理以及后向的诊断分析。

关键词：道路运输企业；安全评价；贝叶斯网络；概率推理；诊断分析

中图分类号：U238

Safety Evaluation Method of Road Transportation Enterprise Based on Bayesian Network

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Abstract: In order to evaluate the safety level of road transport enterprises more accurately and reduce its risk of accident, a safety evaluation model based on Bayesian network is proposed. From a practical perspective based on an enterprise construction safety evaluation index system of road transportation enterprises, using the basic principle of the Bayes network, introduces the basic steps of constructing Bayes network evaluation model. Through the safety evaluation of the road transportation enterprise, the results show that, the logical relationship of this evaluation method can deal with complex, can take different views of experts to effectively build up the final evaluation results, and analysis to the diagnosis of probabilistic reasoning to before and after the enterprise security system.

Keywords: Road transport enterprise; Safety evaluation; Bayesian network; Probabilistic reasoning; Diagnostic analysis