

**“Technical Research and Development for Improving Quality of Road Policy”
Summary of the Study**

No.	Theme	Representative of Researchers
No.22-1	Traffic Incident Detection and Management on Urban Expressways	Tokyo Institute of Technology Prof. Yasuo ASAKURA

This study has developed incident detection method and network simulation model involving user’s behavior with traffic information, and discussed traffic management methods to mitigate the effects of traffic incident on urban expressway networks.

1. Background and Object

In order to achieve more reliable and higher level of service on urban expressway networks, it is expected to provide more accurate travel information just after the occurrence of traffic incident and to implement traffic management which can mitigate the effects of the traffic incident. This research project studies the reduction of the traffic congestion caused by the traffic incident on urban expressways, and aims to develop a travel time prediction method with prompt and accurate detection of traffic incidents. User’s behavior with travel information is involved in the traffic simulation model and the traffic information provision method is proposed that can decrease the loss of the incident on urban expressway networks.

2. Activity in Research Period(3 Years)

[2011]

- (1) Comprehensive review of previous studies on traffic incident detection and management methods
- (2) Development of fundamental theories on traffic incident detection and network simulation
- (3) Development of survey methods for user’s behavior change with traffic information

[2012]

- (1) Implementation of traffic incident detection method and traffic simulation model
- (2) Data collection of expressway user’s travel behavior during incident
- (3) Development of traffic information provision method during incident

[2013]

- (1) Validation and improvement of incident detection method and traffic simulation model
- (2) Analysis and modeling of user’s travel behavior with traffic incident information
- (3) Examination of traffic information provision scenarios using network simulator with user’s behavior

3. Results

- (1) Understanding present situations on incident detection, analysis and management methods

Research topics on traffic incident detection, travel behavior analysis and traffic incident management methods were summarized based on the comprehensive review and study tours.

- (2) Development of traffic incident detection and traffic state prediction methods

Traffic detector data were utilized to detect the location of a bottleneck due to traffic incident. Traffic simulation model to predict traffic conditions has developed and implemented on Tokyo Metropolitan expressways.

- (3) Development of survey and analysis methods of user’s travel behavior with traffic incident information

Probe Person survey and Stated Preference survey methods were developed to collect expressway user’s travel choice behavior under provision of traffic incident information. Survey data on Han-shin expressways were analyzed, and travel behavioral models have been developed considering different information types and behavioral context.

(4) Development of traffic information provision method that minimizes the effects of incident (Fig.-1)
 Based on the surveys for research activities in the world, a dynamic network simulation model has been developed considering user's travel choice behavior with traffic incident information. Various scenarios of information provision under different traffic conditions can be compared to achieve more effective method to mitigate the effects of traffic incident.

4. Papers for Presentation

(1) Takahiko KUSAKABE, Taku SHARYO, and Yasuo ASAKURA; Effects of Traffic Incident Information on Drivers' Route Choice Behaviour in Urban Expressway Network. *Procedia - Social and Behavioral Sciences (Proceedings of EWGT2012 - 15th Meeting of the EURO Working Group on Transportation)*, vol.54, pp. 179-188, Paris, Sep 11-13, 2012.

(2) Chong WEI, Takeshi HAGIHARA, Jun TANABE and Yasuo ASAKURA; Actual Travel Time Prediction Model Based on Current Traffic Conditions. *Proceedings of the 5th International Symposium on Transportation Network Reliability*, Vol.5, pp.243-252, Hong Kong, Dec 18-19, 2012.

5. Practice of the Study and Future Subject

While traffic detector data were fully utilized in this study, it is expected to improve the incident detection methods by using visual data from roadside CCTV cameras and floating data of probe vehicles. The incident detection process has been developed as a module, and would be replaced easily by an advanced method without changing the whole system structure of traffic state prediction and evaluation. It is also required to develop incident detection and prediction methods that can be applied to the regions and countries with less traffic detectors. It is now on going to study traffic monitoring and management methods for inter-urban expressways and arterial roads, and also for developing countries where available traffic data are limited. The findings of this project will give fundamental knowledge to those cases.

6. Contribution to Improving Quality of Road Policy

The technological development in this study will be combined with the traffic simulation systems of the urban expressway companies in Japan. It is expected to reduce total travel times in the network, and to mitigate the social costs of a traffic incident. The quality of mobility of road users in traffic incident is significantly improved when accurate traffic information is provided without delay. This will contribute to increase user's satisfaction level.

7. Reference Website

http://www.plan.cv.titech.ac.jp/asakuralab/projects/h22_h24_mlnt.html

http://transport-titech.jp/seminar_visitor/2013/TSU-IWORKSHOP2013-01/TSU-IWORKSHOP2013-01.html

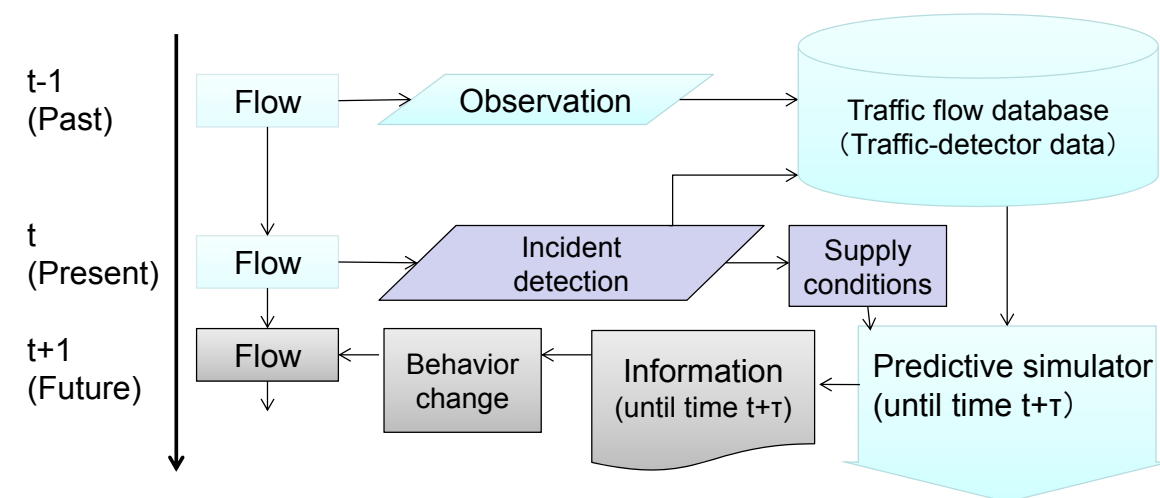


Figure-1 Evaluation System for Traffic Information Provision under Incident