

## Analysis of Highway Vehicle Load in China Based on WIM Data

**Xin RUAN**

Lecture  
Tongji Univ.,  
Shanghai, China  
ruanxin@tongji.edu.cn

Xin Ruan, born 1977, received his Ph.D. from Tongji Univ. in 2006.

**Xuefei SHI**

Prof.  
Tongji Univ.,  
Shanghai, China  
shixuefei@tongji.edu.cn

Xuefei Shi, born 1964, received his Ph.D. from Tongji Univ. in 1999.

**Tianyi YING,**

Civil Engineer  
Architectural Design  
& Research Institute of  
Tongji University, China  
yingtianyi1983@gmail.com

Tianyi Ying, born 1983, received master degree from Tongji Univ. in 2008

### Summary

The current general design code for highway bridge in China is the *General Code for Design of Highway Bridges and Culverts (JTG D60-2004)*, in which clauses on vehicle live load is generalized from statistics of vehicles on four national highways during the 90s, including National Highway No. 207 and No. 328. Recently, vehicle load on bridges has significantly changed due to the construction and operation of a large number of highways with distinctive vehicle types, speed, weight, etc. After long term research into factual highway load spectrum on a highway in Guangdong Province with WIM apparatus, this paper presents a data comparison between current specifications and actual vehicle load on highways in operation. Statistical analysis show that the vehicle load of present Chinese highway is marked with features of heavy traffic, large number of weighty vehicle and existence of extra-weighty vehicle (with a total weight more than 100t); features such as vehicle weight, axle weight and time headway are remarkably different from the prototype data in current code; the vehicles' time and space distribution also shows distinction from existing domestic and foreign design experience. It is of great significance to research on bridge design and to evaluate live load in highway on the basis of WIM data.

**Keywords:** vehicle load; WIM (Weight-In-Motion); highway

### 1. Introduction

The current general code for bridge design in China is the General Code for Design of Highway Bridges and Culverts (JTG D60-2004), in which clauses on vehicle live load is generalized from statistics of vehicles on four National Highways during the 90s, including National Highway No. 207 and No. 328. Recently, vehicle load on bridges has significantly changed due to the construction and operation of a large number of highways with distinctive vehicle types, speed, weight, etc.

The Weight-In-Motion system could obtain vehicle information without interfering traffic, including number of axles, wheelbase, speed and axle load, thus presenting actual vehicle load process on bridges. The Western countries have already used WIM apparatus to assist bridge design and load evaluation for some time, with measure technique and accuracy rapidly developing. Compared with this, there are relatively much less systematic researches on the same subject. In the investigation of this paper, factual vehicle load spectrum of current highways is obtained and compared with data features of the code in operation, through the long term tracking survey on the vehicle load of a highway in Guangdong Province, with WIM apparatus.

### 2. Introduction to Weight-In-Motion System

The data directly obtained by the WIM system are mainly axle load and wheelbase. With built-in analysis software and self-developed ad hoc data analysis program, data such as space headway and vehicle weight could be further obtained, thus to develop traffic spectrum of the cross section that concerns, which is of great value for traffic engineering and research on vehicle load model.