



Safety of live loads for the bridges in Russia, USA and Europe

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Summary

The paper analyses safety providing of standard designing live loads for the bridges in Russia, United States and Europe. It shows that Russian and USA codes have approximately similar safety providing of these standards, but code of European Union has too high one.

Keywords: bridge; safety; live load; traffic; probability model; truck.

1. Introduction

What is the standard designing live load? In accordance with the methodology of design of bridges on limit states as standard live loads on bridges should be considered maximum operating load under normal operating conditions.

Normal operating conditions, in turn, implies the movement of vehicles in free flow, i.e., when the driver of the vehicle at its discretion chooses speed according to the rules of the road.

Deviations from normal operating conditions (traffic jams on the bridge, overloading of vehicles, congestion of heavy trucks) must be taken into account by the factor of safety on live load.

2. Probabilistic nature of live loads on bridges

The impact of real cars loads on bridges is a random function of the parameters of vehicle movement, such as wheel base and axles load of vehicles, structure of vehicular traffic, the intervals between the cars in the convoy.

The author researched these parameters and built probability models of random convoys for traffic conditions in Russia, the United States and the European Union. The park of heavy vehicles is divided relative their weight into several types. Each type is represented by generalized schematic of a car and a percentage of vehicles of this type in traffic.

For Russia the author used the model adopted in the probabilistic justification regulatory loads on scheme of AK (table 1) [1].

For the European Union the structure adopted in the Eurocodes for design of fatigue is used (table 2) [2].

For the United States processed statistical data on the structure of the traffic presented at the Congress of IABSE at Seoul in the year 2012 (table 3) [3].