N E W S
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
SERIES OF GEOLOGY AND TECHNICAL SCIENCES
ISSN 2224-5278
Volume 6, Number 426 (2017), 282 – 288

UDC 625.14: 625.041:625.042

V. G. Solonenko, N. M. Makhmetova, M. Ya. Kvashnin, S. E. Bekzhanova

Kazakh Academy of Transport and Communications named by M. Tynyshpaev, Almaty, Kazakhstan.
E-mail: makhmetova_n1958@mail.ru v.solonenko@mail.ru

DETERMINATION OF RAIL VOLTAGES AFTER IMPACT OF MOBILE COMPOSITION

Abstract. The results of measurements of edge stresses and stresses in the neck of a rail in a curve with a radius of R = 380 m, obtained during tests on the effect on the path of locomotive CKD6-2108, freight gondola cars 12-9941 and 12-9920, on the section of the Almaty-Chu railway line are presented. The dependences of stresses in the edges of the sole and neck of the rail on the speed of the tested rolling stock are obtained. The possibility of a transition from stresses to lateral forces is considered.

Keywords: railway track, rail, edge stresses, stresses in the neck of the rail, vertical and lateral forces, the tested rolling stock, curve of small radius.

In connection with the ever growing need to increase the capacity of the existing network of railways in the Republic of Kazakhstan (especially the areas bordering China and Russia), the issue of increasing the safety of operation of freight trains of increased mass and length is relevant. The commissioning of heavy trains is a complex task related to the use of more powerful locomotives, increased axle loads, reconstruction of the track infrastructure and power supply, and improvement of the technology of the transportation process.

In addition, increasing the speed of train traffic with increasing traffic density requires increasing the strength and stability of the road. The use of reinforced concrete sleepers and rails of heavy types causes along with the reinforcement of the path to increase its rigidity. Increased rigidity of the track increases the influence of unevenness on the rails and wheels of the rolling stock on deformation and the forces of interaction of its elements. It is established that the disorders of the existing track with reinforced concrete sleepers accumulate more intensively than those with wooden sleepers, especially in the presence of unevenness on the rails.

The reinforcement of the upper structure of the track - laying of heavy-type rails, crushed stone ballast, reinforced concrete sleepers - is associated with an increase in its rigidity. If the wheels of the rolling stock and the track had no irregularities, then the tougher path would have basically positive qualities (would cause less resistance to the movement of trains, less bending stresses in the rails, etc.). But the presence of uneven rolling, welds, slides on wheels, unevenness in the joints and welding places of rails, as well as saddles, wave-like wear and other unevenness on rails significantly worsen the interaction of the elements of the track and the rolling stock.

The accuracy and correctness of the accepted experimental methods for evaluating the force impacts of wheels on the rail track is of paramount importance for analyzing the safety of the use of freight train trains. Edge stresses are the main parameters by which the strength of the rail is determined. They characterize the effect of vertical and lateral forces, as well as the moments from the application of lateral loads and the displacement of the position of the conditioned center of the contact spot between the wheel and the railhead.

In this paper, the results of measurements of edge stresses and stresses in the neck of a rail in an external rail thread with a curve of radius R = 380 m, obtained during testing of freight cars and diesel locomotives in the section of the Almaty-Chu railway line are presented.