

MATHEMATICAL MODEL OF INTERACTIONS BETWEEN RAILWAY AND TRACK CONSIDERING DISTRIBUTIONS OF CONTACT FORCES THROUGHOUT CONTACT SPOTS

The work objective was to develop a mathematical model of interactions between the railway vehicle and the track considering the distribution of contact forces of the wheel-rail pair throughout contact spots. The methods of mathematical modelling and the computer simulation, the theory of vibrations were used. The paper presents a 3D mathematical model of interactions between the railway vehicle and the track. An approximated technique to solve the problem of interactions between the wheel and the rail was proposed determining the location and dimensions of non-elliptic contact spots, including conform contact, and the distribution of normal and tangent interaction forces throughout those spots.

A comparative analysis of the results of contact interactions of the wheel-rail pair was conducted using the model developed for calculating circular 300m-radius curve negotiating for the freight car equipped with the wheels having a different profile of rims.

We came to the conclusion that the technique proposed for solving the 3D problem of interactions of the wheel-rail pair offers the possibility of determining the parameters of different-configuration contact spots and distributing contact forces by those spots. Thus, this technique can be used for calculations of the dynamic performance and wear of the wheels of railway vehicles equipped with the wheels having both conform and non-conform contacts with rails.

Keywords: *mathematical model, wheel-rail contact, distributed forces of interactions throughout contact spots.*

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