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STUDY OF THE DYNAMICS OF FREIGHT CARS WITH RADIAL-TYPE TRUCKS

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At present, a topical problem for the Ukrainian railways is a reduction of freight car and track structure maintenance and repair cost. An increase in train mass and speed significantly increases vehicle and track wear due to increased wheel–rail interaction forces. A way to reduce wheel–rail wear and interaction forces in curves is to use devices that align the wheelsets in a radial orientation.

The aim of this work was to analyze the effect of the design features of freight-car trucks associated with the use of devices that align the wheelsets in a radial orientation on the indices of wheel–rail dynamic interaction and to choose their advisable parameters that would allow one to improve the running gear of different vehicles.

To accomplish these objectives, mathematical simulation, oscillation theory, and elasticity theory methods were used.

The motion of cars with variously designed trucks in curves was simulated. The analysis of the results showed that devices that align the wheelsets in a radial orientation have a favorable effect on wheel–rail interaction processes: they improve the car riding qualities and the wheel–rail interaction indices by (15 – 25) % and (20–45) %, respectively. Advisable parameters of these devices were chosen in such a way as to provide both a far lower level of wheel–rail dynamic interaction for vehicles of different types in curves and their high riding qualities in tangents at speeds up to 120 km/h.

Keywords: *freight car, wheelset radial alignment, car dynamics.*

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