Estimation of manoeuvrability of multi-axis tractor-lorry-trailer combination for transportation of large-dimensioned indivisible loads

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Abstract

The paper describes the peculiarity of calculative and experimental estimation of manoeuvrability of multi-axis tractor-lorry-trailer combination intended for transportation of large-dimensioned indivisible loads (Figure 1).

Figure 1: Typical multi-axis tractor-lorry-trailer combination intended for transportation of large-dimensioned indivisible loads

Such kind of specialized vehicles are used for freightage of indivisible units, machinery and huge equipment for industrial facilities; complete indivisible building blocks and structures and etc. The safety of such complicated transportation process depends on vehicles construction as well as rational planning of goal course considering the tractor and trailer manoeuvrability.

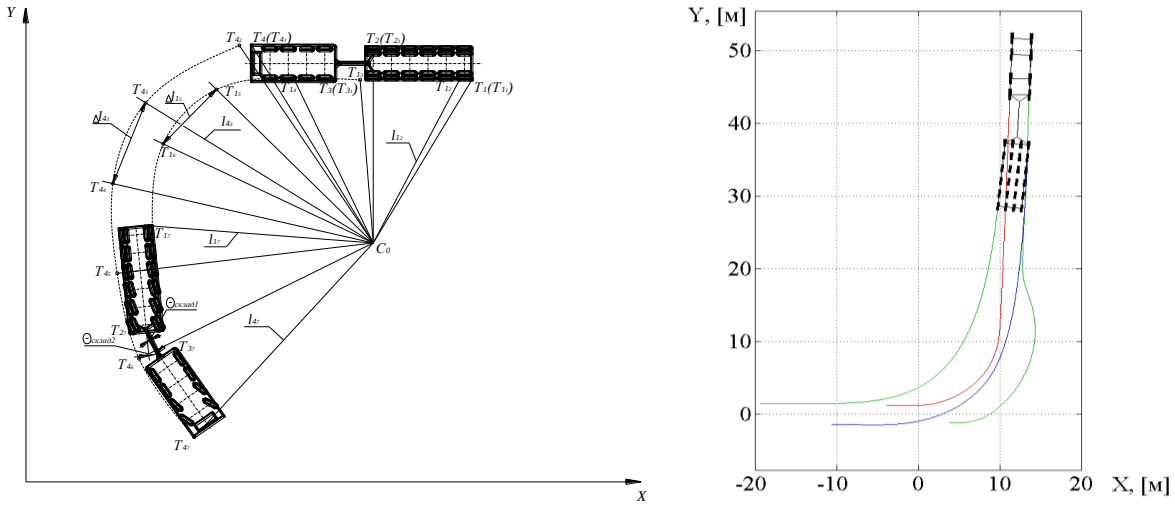

Figure 2: Simulation model of multi-axis tractor-lorry-trailer combination during running into the corner

The paper presents the mathematical equations that describe the behaviour of multi-axis tractor-lorry-trailer combination in condition of curvilinear motion (Figure 2) that could be used for simulation of possible tractor and trailer trajectories in wide range of manoeuvres. The results of simulation are described as well as procedure of real tests on a road (Figure 3). It was found that simulation results have good correlation with experimental data.

Figure 3: Fragment of experimental research

The key attention of the paper is pay to:

- Estimation of influence of steering system construction of a trailer on multi-axis train manoeuvrability;
- Analysis of tractor and trailer trajectories and estimation of possibility of safety movement in real road infrastructure.