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RESEARCH ON THE DYNAMICS OF RAILWAY VEHICLES USING THE SOFTWARE PACKAGE SIMPACK RAIL

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Abstract *– This thesis presents how modern software can be used to predict the behavior of railway vehicles and determine the dynamic quantities that affect vehicle safety and ride quality. The UIC-518 standard, which provides information on all regulations concerning on-track testing and the analysis of results regarding the approval of railway vehicles for use, was utilized to determine the dynamic quantities and their limit values. This standard defines four scenarios or test zones in which vehicle testing must be conducted, differing in track layout and vehicle speed. In addition to the dynamic quantities prescribed by UIC-518, this thesis will measure two additional quantities not required by the standard: the WZ ride comfort index and the wheel and rail wear coefficient. The simulation of the railway vehicle's movement was performed using the Simpack Rail software package, where a complete model of a passenger vehicle was created. The LHB wagon, used on Indian Railways, was taken as an example of a passenger vehicle. The track was designed according to European standards with a gauge width of 1435 mm and a rail inclination of 1:40. The second, third, and fourth scenarios include curve radii ranging from large radii over 2000 m to curve radii of 250 m, where the rail superelevation for each scenario is 100 mm. The speed was chosen arbitrarily but within the limits defined by the standard. Due to the lack of data, track irregularities, which significantly affect safety and ride quality, are not included in this study. At the end of the thesis, the results obtained from the simulation are compared with the limit values according to UIC-518.*

Keywords – dynamics of railway vehicles, UIC-518, WZ ride comfort, rail wear coefficient, Simpack Rail.

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