UDC 629.4:62-788.2

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INCREASING THE SAFETY OF RAILWAY PASSENGER AND FREIGHT TRAFFIC

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In 2020, the Ukrainian Government conducted an audit of the Ukrainian economy for nearly 30 years of independence and decided on the vectors of economic development aimed at European and Euro-Atlantic integration. The audit of the Ukrainian railways showed that most of the railway assets are critically worn. The audit and the vectors became a starting point for the development of the National Economic Strategy of Ukraine up to 2030, which was approved on March 3, 2021. One of the priorities of this strategy is the development of the transport sector by a succession of steps, including railway track and vehicle renewal, the introduction of high-speed passenger transport, and increasing railway traffic safety and environment safety on the Urrainian railways.

The aim of this paper is to work out recommendations on increasing the safety of passenger and freight traffic in Ukraine. The paper generalizes the experience gained over the years of Ukrainian independence in the fundamental and applied transport-oriented reseach conducted at the Department of Sttistical Dynamics and Multidimensional Mechanical Systems, Institute of Technical Mechanics of the National Academy of Sciences of Ukraine and the State Space Agency of Ukraine. This experience may be useful in the implementation of the above steps on the way to the sustainable development of the Ukrainian railway transport. In the paper, emphasis is on new investigations into the passive propection of the cars of a motor car train in emergency collisions whose scenarios are specified by Ukrainian State Standard DSTU EN 15227. Based on a mathematical model of a collision of identical motor car trains, a mathematical model was developed to simulate a collision of a motor car train with a large vehicle at a crossing with account for a specified force characteristic of interaction of the leading car equipped with a passive safety system with a deformable obstacle. The model developed was used in analyzing dynamic loads on the cars of a motor car train with a passive safety system in its collision at 110 km/h with a 15 t large vehicle at a railway crossing. With consideration for the results of previous investigations into the dynamics of emergency collisions of a motor car train with an identical train and a fright car, recommendations were worked out on the passive protection of a home-made leading car in accordance with the requirements of normative documents. The proposed mathematical models and designs of energy-absorbing devices, the research results, and the practical recommendations worked out may be used in designing new motor car train vehicles for the Ukrainian railways in accordance with the DSTU EN 15227 requirements for passive protection in emergency collisions.

Keywords: *railway transport, freight and passenger traffic, motor car train, traffic safety, emergency collision, passive safety system, energy-absorbing devices.*

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Received on June 4. 2021,
in final form on June 8, 2011