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N. YE. NAUMENKO, M. B. SOBOLEVSKAYA, S. A. SIROTA, D. V. GOROBETS

DEVELOPMENT OF PASSIVE SAFETY ELEMENTS FOR NEW-GENERATION COACHES OPERATING ON RAILWAYS WITH 1520 mm GAUGE

Institute of Technical Mechanics of the National Academy of Sciences of Ukraine and State Space Agency of Ukraine,15, Leshko-Popel Str., 49005, Dnepr, Ukraine; e-mail: dep7@ukr.net

In the design of a new-generation coach the passive safety systems (PSS) should be integrated into its structure to protect passengers and a train staff at the most likely crash collision. The research purpose is to develop the energy-absorbing devices (EAD) as the PSS elements for the new-generation high-speed coaches with a mass of 50 – 64 tons. The paper deals with a crash collision with a speed of 18 km/h between the reference train consisting of four coaches and a stationary half-coach according to the EN 15227 European standard for passive safety. A mathematical discrete-mass model has been used to study the dynamic response of the first coach of the reference train for finding the EAD integral parameters, in particular its energy consumption. The novelty of this model is the improvement of a power characteristic of interactions between the vehicles taking into accounts the operation of the absorbing devices of the shifted automatic couplers and the EADs and the possibility of plastic deforming the vehicles. The paper also presents a new finite-element model of the EAD plastic deformation at impact. This model has been used to develop the EAD with energy intensity of 0.3 MJ, and its parameters have been selected. These EADs are designed to locate in the end parts of a new-generation high-speed coach instead of the buffers, which were previously used for sampling the gaps in the contour of couplers gearing.

Keywords: *high-speed passenger train, trailer car, collision, passive safety system, energy-absorbing device.*

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