

A. Zbiciak, C. Kraśkiewicz, S. Dudziak, A. Al-Sabouni-Zawadzka, J. Pelczyński - *An accurate method for fast assessment of under slab mats (USM) performance in ballastless track structures*

, Construction and Building Materials, Vol. 300, 20 September 2021,

Abstract

The paper is devoted to testing, modelling and performance assessment of vibration isolation products applied in ballastless track structures. In the first part of the paper, results of laboratory tests of vibration isolation products, such as under slab mats (USM) and under block pads (UBP) are summarised. On their basis, the Fractional Zener Model (FZM) is calibrated and it is shown that the model properly covers the stiffness and damping characteristics of tested materials in a wide frequency range. Then, results of the finite element analysis performed in a frequency domain using the Abaqus code are presented, taking into account the frequency-dependent material characteristics. The analysis concerned a ballastless track structure with a discrete system of rail fastening (embedded block system – EBS) laid on USM. The proposed approach was compared with the simplified one, in which the frequency-dependence of material properties is neglected. The presented modelling methodology, based on outcomes of laboratory tests, makes it possible to compare various vibration isolation systems in a short time. Consequently, it can be considered as a useful engineering tool.