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**Full Scale Impulse Tests on a Ballasted Track Structure
Equipped with Under Sleeper Pads and Under Ballast Mats**

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Abstract

Recent trends in the development of railway systems include tendency to increase trains' velocities, thus reducing travel times. The tendency itself is a positive phenomenon, as it improves the life quality of people. At the same time, however, higher velocities lead to increased levels of vibration emitted to the surrounding, which affects people as well as natural and built environment.

One of possible ways of reducing such negative effects is the application of vibration isolators, such as resilient under sleeper pads (USPs) and under ballast mats (UBMs) installed in the ballasted track structure. Their role is to reduce the level of vibration, protect the ballast layer against fast degradation and improve track stability.

This paper focuses on experimental impulse testing of a full scale ballasted track structure equipped with either USPs or UBMs. The tests were divided into three phases: excitation of vibration in the track structure simulating a real excitation caused by the train; measurement of the effect caused by the vibration in a selected spot of the track; analysis of measurements' results. Excitation was induced using a modally tuned impact hammer with a force sensor. Then, the vibration effect was measured, which was a parameter that characterises the vibration suppression (acceleration, velocity, or acoustic pressure). Several types of USPs and UBMs were tested, and in each test series the value of insertion loss (IL) factor was determined. The tests showed that structures with USPs are more resistant to fatigue failure than the ones with UBMs.

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Keywords: *Impulse test, Under sleeper pad, Under ballast mat*

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