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Full Scale Impulse Tests on a Track Structure Equipped with Static and Dynamic Rail Dampers

Cezary KRAŚKIEWICZ[1]✉, Artur ZBICIAK[1], Przemysław MOSSAKOWSKI[1], Kacper WASILEWSKI[1], Andrzej DŁUGOŁĘCKI[1]

[1] *Warsaw University of Technology, Faculty of Civil Engineering, Warsaw-POLAND*

Abstract

Increased train velocity leads to shorter travel times but, at the same time, has significant negative effects, such as an increased noise emission. One of possible ways of minimizing this phenomenon is the application of rail dampers.
Rail dampers are additional elements that are fixed to both sides of the rail, and their main function is to accelerate the decay of vibration induced in the rail, thus reducing the level of noise emitted to the environment. Static dampers are elements with an elastic cover that fills either fully or partially rail chambers. They do not change the general dynamic characteristics of the rail system. Dynamic dampers include elements (usually a steel insert) with a certain mass that is distributed periodically along the rail chambers and fixed to the rail using an elastic elastomeric layer. They change the general dynamic characteristics of the rail and thus, suppress the emitted acoustic wave.
The present paper focuses on experimental identification of dynamic characteristics of a track structure equipped with static and dynamic rail dampers, influencing the level of noise emission. Field tests conducted on the railway line section allowed the authors to determine track decay rate (TDR) and insertion loss (IL) factor. It was proved that full scale impulse tests make it possible to assess dynamic characteristics of track structures, and to understand and simulate the phenomena which cause noise emissions. They can be used to investigate solutions aimed at protection of people and environment against noise from the railway traffic.

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Keywords: *Impulse test, Rail dampers, Track decay rate*

✉ *cezary.kraskiewicz@pw.edu.pl*