



Perception of railway-induced building vibrations

^aHans-Peter Gruetz, ^bA. Said, ^bD. Fleischer, ^bH. Kilcher, ^cHugo Fastl,
^aKarl G. Degen

^a*Deutsche Bahn AG, DB Systemtechnik – TZF 101, Völckerstr. 5, 80939 München, Germany*

^b*Obermeyer Planen + Beraten*

^c*Institute for Human-Machine-Communication, TU München, Germany*

Abstract

Trains moving on the track generate low-frequency ground vibrations which may cause noticeable movements of nearby buildings that may result in annoyance of the residents. At present, legal specifications for tolerable vibration limits do not exist in Germany. The paper presents the results of laboratory experiments that shall serve to better assess railway-induced vibrations acting on people in buildings. When upgrading existing railway lines, the vibration level in buildings may increase. With sitting subjects exposed to railway-induced vibrations, the perception-threshold of energy differences for whole-body vibration was evaluated. Signal Detection Theory was used as psycho-physical investigation method. According to the German standard DIN 4150-2 vibration annoyance is assessed by the maximum measured vibration RMS-value during a train pass-by. Vibration signals with the same maximum level but different total energy are therefore rated equally. A study was performed where the perceived vibration of a signal with one short-time maximum (6 dB above remaining constant time history) had to be compared with stimuli without a maximum but different equivalent continuous vibration levels. In this experiment the 2-AFC-method was applied. The results suggest that the maximum level does not reflect the subjective evaluation.

The manuscript was not received at the time of printing the CD-ROM Proceedings