Evaluation of Acoustic and Vibratory Characteristics of Impact Noise Due to Rail Joints

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Impact noise induced by rail joints is one of important noise sources at waysides of railway lines. In order to investigate the vibratory and acoustic characteristics of the impact noise, the field tests were conducted at two rail joints on an operational meter-gauged railway line. It was found out that the sound power of the impact noise increases in proportional to about 2.5 powers of train speed in the speed range of 40 km/h to 100 km/h. The impact noise does not depend on vehicle weight, but on track conditions at rail joints. Estimation of contributions from rail and sleepers to the impact noise by using their vibration shows that the noise generated from the sleeper below the rail joint can be the most dominant source below 500 Hz and that from the rail can be the most dominant above 1 kHz. An attempt was made to verify validity of a prediction model for impact noise. Prediction using the model mostly agrees with the results derived from a field test and it is indicated that modifying the track parameters has a potential to reduce impact noise.