

# Performance study of the inertial monitoring method for railway turnouts

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## Abstract

The inertial measurement method of the ESAH-M (Electronic Analysis System of Crossing – Portable) system for the railway turnouts is a promising technique in railway infrastructure. However, the measurement accuracy and sensitivity are affected by many influencing factors that could lead to the great uncertainty of the measurement. Error analysis of the one-sensor inertial measurement system and the progressive optimization of the data processing are carried out to improve the measurement accuracy. The spatial propagations of the vibration waves are studied to find out the possible error sources. The inaccuracy of the measurement and the data processing depend largely on the relationship between the impact point on the frog nose and the sensor position. As the result, the coefficient of variation of the measured accelerations could be significantly reduced under the consideration of all the possible influencing factors to improve the performance of the inertial measurements systems.

KEYWORDS: [Turnout](#), [frog rail](#), [vibration propagation and decay](#), [error analysis](#)