

## Original Paper

# Wireless Measurement System for Ground-borne Vibration and Vibration Amplifications in Buildings

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## Abstract

The environmental impact on residents of buildings, such as adverse effect on sleep and physical discomfort is caused by ground-borne vibration sources such as rail transit systems, road traffic, construction sites, and industrial plants. To estimate the impact of these vibrations on the residents, it is necessary to measure the tri-axial vibrations in the vertical and horizontal directions of the buildings as specified in the international standard regulated by ISO 2631-2:2003. A wireless measurement system for simple and accurate measurement of building vibration was developed. Five wireless vibration measurement devices (installed together with a data recorder in the building) are controlled simultaneously by an outdoor mobile PC or a laboratory PC via wireless local area network and an Internet connection. It sends the vibration acceleration waveforms recorded in buildings over the wider internet communication system to the laboratory PC. The wireless measurement system was used for measuring vibration in two- and three-story detached houses of wooden or steel construction. The impact on the residents may be caused by the vibration amplifications associated with building structural resonances. The vibration amplifications in 120 houses were evaluated as ratios and level differences in 1/3 octave band vibration accelerations measured at the ground near the substructure and floors.

## Keywords

Ground-borne vibration – Wireless measurement – Vibration amplification – Detached house