

## INFLUENCE OF RUBBER GRANULES CONTENT ON THE ISOLATION RESPONSE OF AN IN-FILLED BARRIER WALL

Mehrnoosh FEIZY

*M.Sc. Student, Department of Civil Engineering University of Kashan, Kashan, Iran  
mehrnooshfeizy@gmail.com*

Ali MIRZAI

*Assistant Professor, Department of Civil Engineering, Faculty of Engineering, University of Kashan, Kashan, Iran  
ali.mirzaii@kashanu.ac.ir*

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Ground vibration generated by vibration sources, such as earthquake, explosion, transport vehicles and construction activities has harmful influences on the structures and residents, ranging from causing annoyance to structural damage and loss of life. Most of the vibratory energy affecting nearby structures is carried by surface (Rayleigh) wave that propagates in the zone close to the ground surface (Miller & Pursey, 1995; Sanchez-Sesma et al., 2011). In this study, the emission of surface waves generated from vibration sources has been investigated. In general, the effects of seismic forces on structures have been decreased by installing energy destruction systems. In order to obstruct the wave propagation in the soil, wave barriers are commonly preferred by engineers. Wave barriers are commonly installed in the ground to reduce the ground vibration on wave propagation and the effect of ground vibrations on nearby structures. Most energy associated with any surface waves is absorbed because of geometric damping and material damping (Alzawi & EI-Naggar, 2011). There are only a few experimental data about the effects of frequency of excitation, material type and dimensions of the wave barriers on vibration control and isolation. The efficiency of the wave barriers depends on different parameters such as depth, width, wavelength, infill materials, and distance from the vibration source.



Figure 1. Photo of Experimental Test.

This paper considers the design, the installation, and the experimentation and evaluation of the effectiveness of a wave barrier in the soil to reduce vibrations. In this laboratory work, various wave barriers with different rubber content and different width have been studied. It is the purpose to study the effects of the in-filled trench (soil-rubber mixture is used as in-filled material) as a wave barrier on the ground vibration under excitation of a mechanical vibrator (with a rubber hammer) in small-scale laboratory tests. In this work, the soil is considered as elastic half-space medium and the density of soil assumed to be  $1.8 \text{ ton/m}^3$ . Trenches with widths of 5 cm and 10 cm are used as wave barriers to isolate ground vibrations. Geophones are used to get the test data. The amplitude of the wave recorded by each geophone is investigated to obtain the influence of in-filled materials with different content and width on ground vibration. The work is based on

collecting, analyzing, and comparing the measured data in different tests to investigate the effects of wave barriers on wave propagation.

The results confirm that the vibration screening system using wave barriers filled with soil-rubber granular mixture can be used as a reduction measure for soil vibrations.

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