

Medium-scale on field validation of a resonant metabarrier for the control of surface Rayleigh waves

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Abstract: The growing interest about meta-structures from the civil engineer community has led to the development of novel low frequency isolation systems for ground borne vibrations and seismic waves. Recently, a resonant Metabarrier, i.e. an array of meter-size resonators embedded in the ground around the structure, or a cluster of structures, to be protected, has been proposed. The metabarrier can attenuate the surface ground motion induced by Rayleigh waves, with the potential ability to retrofit and shield existing vulnerable structures including historical buildings and cultural heritage sites. Additionally, it can be tuned to operate at specific frequencies ranges, for instance at the resonant frequencies of the structure. While the metabarrier conceptual design has been validated numerically and at small-scale laboratory tests, its engineering implementation still needs an on-field validation. As such, we present the preliminary results of an experimental campaign, carried out at the Euroseistest facility (euroseisdb.civil.auth.gr) within the framework of the ReWarD project (<https://site.unibo.it/reward/en>), meant at measuring the attenuation performance of a medium-scale metabarrier. In particular, a metabarrier will be designed and realized according to the site soil properties and the real mechanical behaviour of the resonators. Next, Multichannel Analysis of Surface Waves (MASW) will be used to measure the soil response in the presence of the metabarrier or without it. The test is expected to confirm an attenuation of the ground motion in the presence of the metabarrier.

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