**APPLICATION OF ACOUSTIC AND SEISMIC EXCITATIONS FOR BURIED TARGET CHARACTERIZATION: VARIATIONS IN TARGET RESPONSE DUE TO BURIAL DEPTH AND SOIL TYPE**

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**Abstract**

Acoustic and seismic sources of ground excitation have been used to detect buried objects using non-contact vibrations sensors, such as a laser Doppler vibrometer (LDV). Factors that affect the response of a buried object to ground excitation include soil type, burial depth, type of ground excitation, and type of the buried object. Therefore, understanding the response of buried objects is required for a high probability of detection. In this study, acoustic and seismic ground excitation methods are used to study the response of an object buried at multiple depths. The study is conducted on two soil types, a limestone (gravel) site, which represents hard soil, and a grass site which represents soft soil. A group of 3C accelerometers around the target were used to study how a target responds to incoming seismic waves. Ground surface motion on and off the target is measured by placing an accelerometer directly above the center of the target and off the target at a distance of 0.5m. For both source types, the off-target vibration level is higher in the grass (soft) site than in the limestone (hard) site. For both soil types, the seismic source generates higher on and off-target vibration levels, which is due to the higher drive level of the shaker compared to the speaker. For both source and soil types, with increasing depth, the target's resonant frequencies (RF) increase while the on/off ratios decrease, which could be attributed to the increase in both the mass loading above the target and the soil shear stiffness with the burial depth.

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