

Soil Characterization in Centrifuge Models through Measurement of S- and P-wave Velocities Using an Enhanced Bender Elements System

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ABSTRACT

The determination of the dynamic properties of the soil is a critical issue in geotechnical Engineering. It is of a particular importance in problems involving dynamic excitation of soil systems, such as earthquakes. This research focus on measuring the velocity of seismic waves, particularly shear waves, in dry and saturated soil models in the centrifuge. The high noise during the centrifuge operation and the need of using a number of bender elements in the same model make the use of bender elements in the centrifuge more challenging. The research starts with improving the current bender elements system at RPI Geotechnical Centrifuge. This involves solving the electric and electromagnetic problems in the system and reducing noise and ghosting effects. The improved bender elements system is then used to determine the shear (S) and dilatational (P) wave velocities of dry and saturated Ottawa sand at different void ratios and different overconsolidation ratios in the centrifuge. The research also involves the determination of the effect of preshaking on the dynamic properties of soil. Moreover, the shear wave velocity measurements are also used to estimate the effect of overconsolidation on the coefficient of lateral earth pressure at rest (K_0). A comparison of the results of this study is done with those published in the literature.