

# EVALUATION OF THE VARIABILITY ON THE SEISMIC RESPONSE IN THE CALLAO CITY, PERU, USING EQUIVALENT LINEAR ANALYSES

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## ABSTRACT

Callao is a seaside city located in the western part of Metropolitan Lima. Reports of historical earthquakes have shown evidences of the influence of the near-surface soft soil deposits in the amplification of seismic waves. In this regard, this study aims to evaluate the variability of the seismic response at different locations along an irregular soil substructure towards eastern Callao, where stiff materials are expected, by the equivalent linear method formulation. The dynamic characterization of the target areas was obtained by a combination of geotechnical and geophysical field surveys. First, single point microtremor measurements allowed the estimation of the fundamental periods of vibration. On the other hand, multichannel analysis of surface waves tests and microtremor array measurements provided information regarding shear-wave velocity profiles for the near-surface and deep substructure, respectively. In addition, modulus reduction and damping curves were obtained for the high plasticity clayey top materials by means of resonant column and torsional shear tests. From the aforementioned information, suitable equivalent linear (EQL) analyses were performed for one-dimensional soil profiles at selected locations. Comparisons of results obtained with EQL analysis and linear analyses for different synthetic input accelerograms showed that both PGA and shear strain as well as the frequency content of the computed strong motions, reflected in transfer functions and response spectra, differ in particular manner for each of the soil column models considered mainly as a consequence of the thickening of the soft clayey layers towards the Pacific Ocean.

*Keywords: site effects, one-dimensional response, equivalent linear method, irregular soil substructure*

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