

Discussion on Dispersion Curves of Non-penetrable Soils from in-Situ Seismic Dilatometer Measurements

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Abstract : The estimate of the velocity of shear waves (V_s) is essential in seismic engineering to characterize the dynamic response of soils. There are various direct methods to estimate the V_s . The authors report the results of site characterization in Macerata, where they measured the V_s using the seismic dilatometer in a 100m deep borehole. The standard V_s estimation originates from the cross-correlation between the signals acquired by two geophones at increasing depths. This paper focuses on the estimate of the dependence of V_s on the wavenumber. The dispersion curves reveal an unexpected hyperbolic dispersion curve typical of Lamb waves. Interestingly, the contribution of Lamb waves may be notable up to 100m depth. The amplitude of surface waves decrease rapidly with depth: still, their influence may be essential up to depths considered unusual for standard geotechnical investigations, where their effect is generally neglected. Accordingly, these waves may bias the outcomes of the standard V_s estimations, which ignore frequency-dependent phenomena. The paper proposes an enhancement of the accepted procedure to estimate V_s and addresses the importance of Lamb waves in soil characterization.

Keywords : dispersion curve, seismic dilatometer, shear wave, soil mechanics

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