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Determining G-γ Degradation Curve in Cohesive Soils by Dilatometer and in situ Seismic Tests

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Abstract : This article discusses the possibility of using dilatometer tests (DMT) together with in situ seismic tests (MASW) in order to get the shape of G-g degradation curve in cohesive soils (clay, silty clay, silt, clayey silt and sandy silt). MASW test provides the small soil stiffness (G_o from v_s) at very small strains and DMT provides the stiffness of the soil at ‘work strains’ (M_{DMT}). At different test locations, dilatometer shear stiffness of the soil has been determined by the theory of elasticity. Dilatometer shear stiffness has been compared with the theoretical G-g degradation curve in order to determine the typical range of shear deformation for different types of cohesive soil. The analysis also includes factors that influence the shape of the degradation curve (G-g) and dilatometer modulus (M_{DMT}), such as the overconsolidation ratio (OCR), plasticity index (IP) and the vertical effective stress in the soil (s_{vo}'). Parametric study in this article defines the range of shear strain g_{DMT} and G_{DMT}/G_o relation depending on the classification of a cohesive soil (clay, silty clay, clayey silt, silt and sandy silt), function of density (loose, medium dense and dense) and the stiffness of the soil (soft, medium hard and hard). The article illustrates the potential of using MASW and DMT to obtain G-g degradation curve in cohesive soils.

Keywords : dilatometer testing, MASW testing, shear wave, soil stiffness, stiffness reduction, shear strain
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