

Soil-Structure Interaction in Stiffness and Strength Degrading Systems

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Abstract : We study the effects of soil-structure interaction (SSI) on the inelastic seismic response of a single-degree-of-freedom system whose hysteretic behaviour exhibits stiffness and/or strength degrading characteristics. Two sets of accelerograms are used as seismic input: the first comprising 87 record from stiff to medium stiff sites in California, and the second comprising 66 records from the soft lakebed of Mexico City. This study focuses in three seismic response parameters: ductility demand, inter-story drift, and total lateral displacement. The results allow quantitative estimates of changes in such parameters in an SSI system in comparison with those corresponding to the associated fixed-base system. We found that degrading features affect significantly both the response of fixed-base structures and the impact of soil-structure interaction. We propose a procedure to incorporate the results of this and similar studies in seismic design regulations for SSI system with anticipated nonlinear degrading behaviour.

Keywords : inelastic, seismic, building, foundation, interaction

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