

SEISMIC SSI STUDIES FOR LINEAR AND NONLINEAR RC AND SC WALL STRUCTURES INCLUDING DEEPLY EMBEDDED SMR

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ABSTRACT

The paper investigates the reinforced concrete (RC) and steel-composite concrete (SC) shearwall structures behavior under severe earthquakes. Both linear and nonlinear SSI analyses are considered in accordance with the engineering practices in US and Japan.. The nonlinear SSI approach is based on an efficient iterative hybrid approach which couples the equivalent-linear complex frequency overall SSI system analysis with the nonlinear time-domain superstructure analysis.

Two case studies are presented: 1) surface typical RC shearwall structure and 2) a deeply embedded SMR structure considering both linear and nonlinear SSI under severe earthquake conditions. The nonlinear aspects address both the RC/SC wall behavior and wall-soil interface modeling.

For the RC and SC wall nonlinear behavior modeling are based on both the US and the Japan standards. For the SMR wall-soil interface modeling three assumptions are considered: bonded interface, smooth interface and nonlinear slip interface.

Results are obtained for two seismic severity levels, for 0.30g and 0.60g. The RG160 spectrum compatible acceleration are considered.

The obtained results using different modeling options are compared. The comparisons are made for ISRS, story drifts, structural displacements and forces and moments in walls.