Title Effect of Concrete Confinement on the Nonlinear Dynamic Response of Shear Walls using Layered Shell Element

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Abstract

Reinforced concrete walls are a major structural member in tall concrete buildings to resist lateral loadings induced by winds and earthquakes. Analytical study of effect of confined concrete shear wall under seismic loading is conducted by using nonlinear time history analysis. Nonlinear layered shell element modeling technique is used to predict the nonlinear behavior. Experimental data from wall tested at the Portland Cement Association were conducted to verify the nonlinear layered shell modeling technique. It is found that the layered shell model gives satisfactory agreement with the experimental data.

In order to study effect of the confined concrete, different volumetric ratios of lateral reinforcement to concrete core are varied. There is 30-story planar wall with different proportion of concrete confinement along the wall height (first bottom story, 15-story, and 30-story). Based on the analysis results, it is found that the increment in volumetric ratio of lateral reinforcement to concrete core does not significantly increase the shear demand and moment demand. For unconfined concrete walls should take into account the effect of bar buckling.

Keywords Confined concrete shear wall; Nonlinear time history analysis; Nonlinear layered shell element; Volumetric ratio; Bar buckling.