Influence of the Retrofitting Technique on the Seismic Response of Reinforced Concrete Structures

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Abstract

In this paper, a numerical investigation has been carried out in order to compare the seismic behavior of an existing non-ductile reinforced concrete (RC) structure under different retrofitting schemes (RC-Jacketing, Steel-Bracing and Steel-cage technique) and the same structure designed according to the Algerian seismic code, RPA 2003, in order to establish the most effective and economic retrofit solution. The construction details for the existing building are typical of constructions prior to the seismic guidelines of 1980. The frame structure is evaluated using both a nonlinear static (push-over) analysis to estimate the inelastic strength and deformation capacities and nonlinear dynamic time-history analyses under a set of different ground motions for comparison purposes. The results indicate that retrofitting with RC-Jacketing yields good performance in terms of ductility resistance capacities, the Steel-Bracing system resistance is increased but may collapse for great PGA of ground motions, and the Steel-cage system has a large resistance but low ductility compared to the other retrofitting techniques.

Keywords: Retrofitting, Pushover analysis, RC-Jacketing, Steel-cage, Nonlinear dynamic