عنوان مقاله:

Robust Design of Reinforced Concrete Moment-Resisting Frames

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خلاصه مقاله:

Reinforced concrete moment resisting frame (RCMRF) is one of the most popular structural systems. Conventionally, buildings with RCMRF systems are designed to satisfy the relative displacement, resistance, and flexibility requirements defined by the design codes. Structural design codes have given different ranges of design parameters that the designers and engineers must consider in the design process of structures and the values selected for these parameters affect the seismic behaviour of the structures. However, performance assessment of the RCMRF under the earthquake loading to limit the probable levels of damage has a complicated and difficult procedure that is time-consuming for designing of ordinary buildings. In this study, to prevent this time-consuming process, tighter ranges for design parameters have been attempted to improve the seismic performance of the RCMRFs. In this regard, databases of RCMFs were created for different ranges of design parameters. The Particle Swarm Optimization (PSO) algorithm is used to create these databases and RCMRFs are optimally designed according to ACI ۳۱۸-۱۴ code. Then, nonlinear time history analysis according to ASCE/SEI ۷-۱۶ code was performed on the RCMRFs in each one of the databases and the statistical analysis of local and global results acquired from the nonlinear time history analysis is carried out. Finally, tighter ranges of design parameters have been determined to achieve more robust structures without involvement in time-consuming processes.

کلمات کلیدی:

reinforced concrete, Moment-Resisting Frames, optimization, robust design, time history analysis, Non-linear analysis