DRIFT-CONTROL EVALUATION OF RC-MRF STRUCTURES USING NONLINEAR DYNAMIC ANALYSIS

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Relative lateral displacement (Drift) is one of the important controlling factors in the seismic design of reinforced concrete structures. According to the Iranian seismic design code (2800 guideline), drift of the center of mass for each floor should not exceed the amount as set forth in guide. Also the base shear of building can be calculated without regarding the limitation for the fundamental period of building when story drift control is the target. In the other words, it can be the amount of fundamental period of structure without regarding to limitation of 1.25 times the period of the empirical relationship of the code takes into account (Standard 2008, 2008; UBC, 1997). The removal of these limitations cause reduction the base shear as well as the lower of story drift and ease of structure response in control of drift. The present research aims to evaluate the drift criteria guidelines using nonlinear time history analysis (NLTHA).

For this purpose, the 8-story models of structural reinforced concrete intermediate moment frame systems have been studied. Nonlinear time history analysis is conducted using five earthquake records (Naumoski et al., 1988). In order to create the homogeneity with earthquake records used in design of frames, enable better comparison between the results and also use the resulting average for nonlinear dynamic analysis, all acceleration time histories correspond to the spectrum of Iranian code for soil type III tantamount. Scale of acceleration time histories in the proposed method is used in the third edition of the code of 2800. Characteristics earthquake of used in Table 1 and acceleration response spectrum is shown in Figure 1.

Table 1. Earthquake used in the NLTHA

Record	Earthquake	Year	M_w	Station	Dist (km)	PGA (g)
1	Tabas, Iran	1978	7.35	9101 Tabas	55.54	0.835
2	Manjil, Iran	1990	7.37	Abbar	40.43	0.515
3	Kobe, Japan	1995	6.9	OSA.J	47.49	0.0786
4	Kocaeli, Turkey	1999	7.51	Gebze	47.03	0.244
5	Northridge, California	1994	6.69	Castatic, Old Ridge Route	44.29	0.489

Data Source: Pacific Earthquake Engineering Research (http://peer.berkeley.edu/smcat)

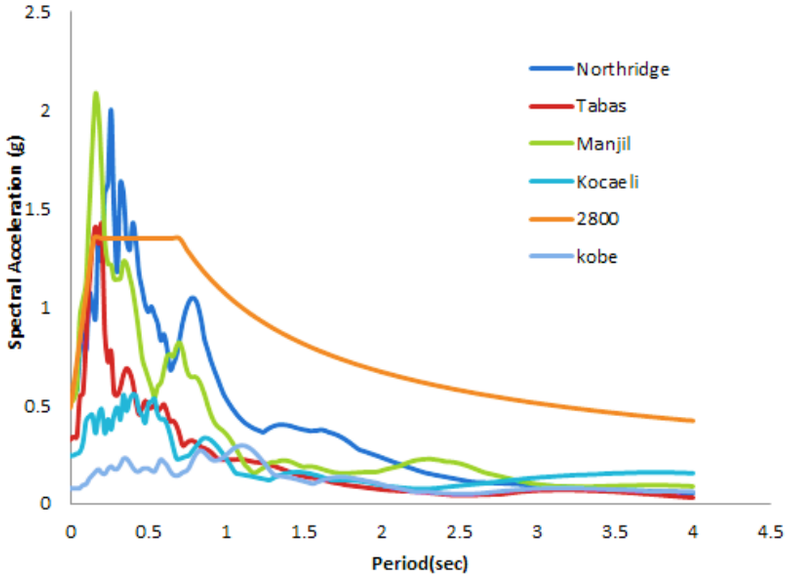

Figure 1. Acceleration response spectrum of the earthquake used in NLTHA

The results of case study analysis because of different frequency content suggest the failure to response structure based on the life safety performance level for the earthquake records. As an example, roof displacement response of structure and inter-story drift diagram for Tabas earthquake show in Figures 2 and 3.

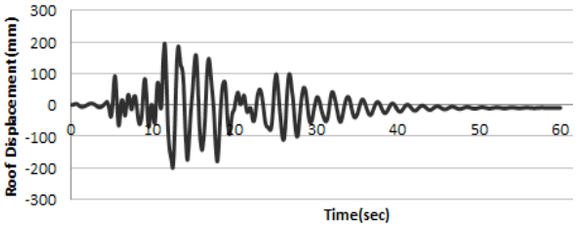

Figure 2. Roof displacement response profiles

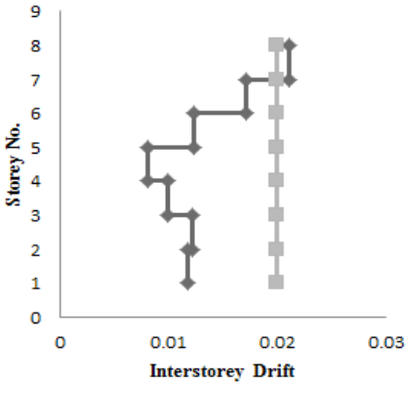

Figure 3. Inter-story drift profiles

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