EVALUATING PERFORMANCE OF AN IRREGULAR REINFORCEMENT CONCRETE STRUCTURE DESIGNED BASED ON THIRD EDITION 2800 STANDARD CRITERIA

Sajad BARARI
M.Sc. Student, Department of Civil Engineering, Razi University, Kermanshah, Iran
s.barari @pgs.razi.ac.ir

Amirhoshang AKHAVEISSY
Department of Civil Engineering, Faculty of Engineering, Razi University, Kermanshah, Iran
Ahakhaveissy@razi.ac.ir

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The basic seismic design of structure is based on 2800 standard in Iran. The minimum terms and conditions of seismic building code of Iran (2800 standard- third edition) are to supply less fatality in a predicted strong earthquake and low damage for building in a light ground motion. Hence, securement of life safety performance level of structure is the main target of this standard. In this paper, The 2800 standard performance criteria is used to assess and control the seismic performance level of a six story irregular reinforcement concrete moment resistant frame as shown in Figure 1.

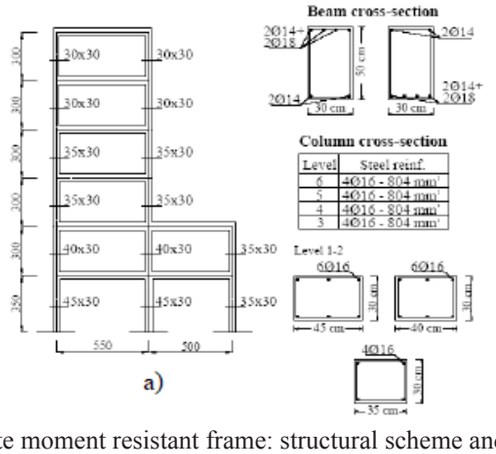


Figure 1. Irregular concrete moment resistant frame: structural scheme and element cross sections

The standard 2800, Version 3, for designing is considered. Nonlinear behaviour of a structure which is over designed can not be a base control for evaluating of 2800 conditions to attain seismic performance level. Hence, this study is mentioned two important qualifications: 1) the optimum member is used for strength demand and 2) the members design is change according to allowable relative displacement acceptance criteria for deformation demand.

Nonlinear Static Analysis (NSA) is used for determination of non linear response of the structure under earthquake shaking and performance level. The performance point of structure is assumed according to ATC40 code and damages (relative displacement and detailed location of plastic hinges) are reported. Building seismic demand assessment by NSA is based upon the pushover or capacity curve, which is evaluated by subjecting a non linear detailed model of the structure to a lateral load pattern of increasing magnitude to generate a total base shear-roof displacement relationship and deformed building configurations. Load pattern are selected as Uniform and SRSS based on FEMA-356. The auto plastic hinges of

member is selected in SAP2000 V-14.

Figure 2 showed capacity curves of different load patterns. The most critical performance point and local damage of structure (plastic hinges) is presented in Figure 3.

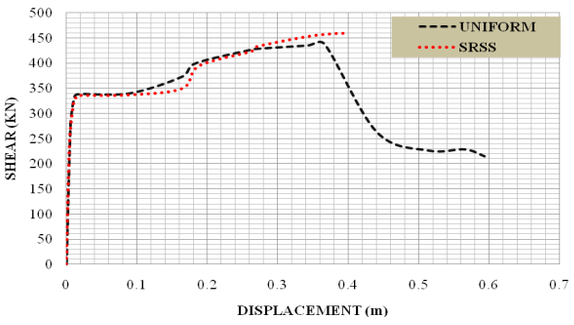
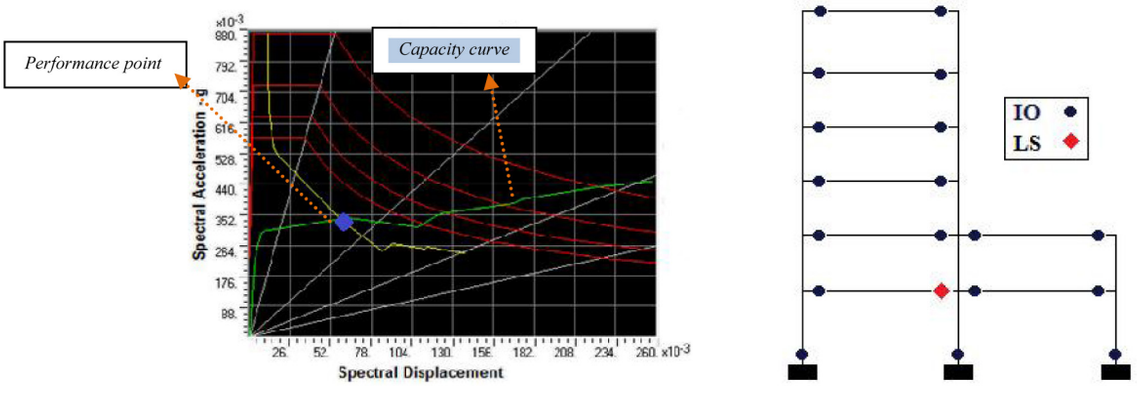


Figure 2. Capacity curves of different load patterns



(a) (b)

Figure 3. a) Performance point of structure, b) plastic hinges of structure

Nonlinear static pushover analysis of irregular six story concrete frame was performed. The results were determined by evaluating performance point and plastic hinges. Spectrum load pattern led to most critical performance point and plastic hinges of structure. Plastic hinges was life safety and immediate occupancy which it means that the worst situation of frame in strong motion is life safety performance level. By all things in to consider, it could be concluded that an irregular building which was designed by 2800 standard satisfying the term of life safety performance level.

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