



Seismic Evaluation of RC Frame Designed by Forced Based Design and Direct Displacement Based Design

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Abstract

Force based Design (FBD) and Direct Displacement Based Design (DDBD) methods are used in this paper for seismic design of RC moment resisting frame. FBD requires designing the structure for a given load and checking for displacement; however, the damage is directly related to displacement. For assessment of structure during the earthquake for damage control state accepted that FBD has limitations. Performance Based Seismic Design (PBSD) methods were found to be a more reliable approach for elastic and inelastic behaviour of structural and non-structural elements and are effective in overcoming FBD limitations.

In the present study, DDBD and FBD methods are utilized to study RC moment resisting frame of 8 stories, which is regular in terms of height and bay width with conforming to IS code. Furthermore, the capacity design principle is used for DDBD to make sure to pre-determine failure patterns. After obtaining the internal design force of structural elements IS 456 - 2000 and IS 13920-1993 are used to design and detail the structural member.

Performance evaluation of frames is carried out by nonlinear static pushover analysis and nonlinear dynamic time history analysis. Comparison is done for Base shear Vs. Displacement and failure pattern is studied. Further, based on pushover analysis response modification factor, R is investigated.

The Results obtained shows performance satisfaction when evaluated by nonlinear static analysis (Pushover). Response modification factor, R, calculated for DDBD and FBD frames, and the values obtained for both approaches are greater than the IS 1893 specified value (R=5.0) which indicate the ductility effect account for both methods.

Keywords: Force based design (FBD), Performance based seismic design (PBSD), Direct displacement based design (DDBD)