



Seismic Evaluation of Eccentric Brace Frame Designed by Force Based Design and Performance Based Plastic Design Methods

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Abstract

Eccentric Brace Frames (EBF) is a combination of moment Resisting Frames (MRF) and Concentric Braced Frames (CBF). It combines the stiffness and strength of a concentric braced frame with the energy-dissipating capacity and inelastic behavior of a moment frame. The current seismic codes used for the design of EBF are based on the Force Based Design (FBD) method where, the substantial ductility and inelastic deformation capacity of the EBF cannot be completely used since the inelasticity is implicitly compensated by the response reduction factor 'R'. The drawbacks of the FBD method are overcome by using the Performance Based Plastic Design (PBPD) method. The PBPD method is based on an energy balance equation that considers the system's inelastic behavior by predefining the target drift and pre-selected yield mechanisms. By explicitly accounting for the system's inelastic behaviour in the design formulation, this method tends to be more reasonable and takes into consideration damage unpredictability, which is unusual in medium- to high-intensity earthquakes. In the present study a 10- storey D-Braced Eccentric Brace Frame is studied and designed using FBD method and PBPD method, and evaluation of seismic is been carried out through Non-linear Static Pushover Analysis (NSPA) and Non-linear Dynamic Time History Analysis (NDTHA). According to the study, the PBPD method for EBF is substantially more effective than the FBD method in attaining a specific inelastic displacement for a given set of seismic hazards.

Keywords: Eccentric brace frames (EBF), Performance based plastic design (PBPD), Force based design (FBD), Non-linear dynamic time history analysis