

CONSIDERING THE EFFECT OF VERTICAL GROUND MOTION IN NONLINEAR STATIC PROCEDURE

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Keywords: Pushover Analysis, Near-Fault Ground Motion, Vertical Component

ABSTRACT

In the near-field Sites (assume less than 20 km) structures may experience shaking considered as forward-directivity effect that often contain significant pulses in the velocity time history. These ground motions is called near-field earthquake with impulsive characteristics. Pulses in velocity time history affect seismic performance of structures (NEHRP, 2011). Some other characteristics of near-filed earthquakes are: Strong vertical component, large ratio of horizontal Fault-normal component to horizontal fault-parallel component Chopra et al. (2001), High Frequency content (Ghobrah, 2004). Vertical component of ground motion have significant effect on column axial forces and beams ductility demands. One of the nonlinear analysis limitations is that pushover analyses are not able to calculate the effect of vertical component by lateral load pattern and demonstrate accurate result for near-field earthquake. The objective of this paper is to propose a method to improve the accuracy of pushover analysis in the near-field region. For this purpose, in this paper in addition to lateral load pattern (Code distribution load pattern) an appropriate vertical load pattern is considered. Then the structure is pushed in the both direction at the same time. 2 dimensional Steel moment resisting frames, SAC-3 and SAC-9 are Simulated in PERFORM 3D and subjected to 7 impulsive near-field ground motions (Ohtori et al., 2003). Result shows that, use of proposed pushover methods for Code load distribution and RSA load pattern leads to decrease Beam and column plastic hinge rotation errors the accuracy of nonlinear static analysis improved in estimating the performance of structures in near-field earthquakes.

INTRODUCTION

In recent years nonlinear static analysis has been impressive progress. In these analysis which have been called pushover analysis, used simplified nonlinear method for estimating structure Seismic performance. With the publication of capacity spectrum method of ATC-40 report in 1996 and coefficient method of FEMA-356 report in 2000, several researches have been conducted on nonlinear static analysis. Chopra and Goel (2002), suggested a modal pushover procedure that combines response of individual modes