

Title Applicability of Enhanced Pushover Analysis Methods Considering Higher-Mode Effect for Tall Buildings

Year 2010

Author Amelia Kusuma

Exam Committee Dr. Pennung Warnitchai (Chairman)
Dr. Naveed Anwar (Co-Chairman)
Dr. Kyung-Ho Park (Member)
Dr. Gregory L.F. Chiu (Member)

Abstract

The shape, height, and complexity of building structures are essentially increasing nowadays. Performance Based Design (PBD) is a logical design process that will give a solution to achieve a specified performance. The need for the analysis tool to determine the performance of the structure becomes important. For practical reasons, engineer may choose NSPA rather than Non-Linear Time History Analysis (NLTHA), even though NSPA has an inherent deficiency that its invariant load distribution cannot take the higher-mode effect into consideration which plays important role for high-rise structures. Attempts had been made to develop NSPA so that the higher-mode effects can be considered. This study investigates the applicability of several enhanced pushover methods in predicting the response characteristic of RC frame building through comparison with benchmark responses obtained from NLTHA (using one earthquake ground motion) as an exact solution. From the results, it can be clearly seen that enhanced pushover analysis methods can be used to evaluate particular responses of the mid-height structure although some methods cannot give conservative results compared with NLTHA but these methods cannot obtain conservative results for high-rise structure.

Keywords Performance based design; Enhanced pushover analyses; Higher-mode effect; Seismic evaluation; Tall Buildings).