INFLUENCE ANALYSIS OF CONCRETE STRESS-STRAIN RELATIONSHIP VARIATION AND BUILDING SPAN TO THREE DIMENSIONAL FRAME STRUCTURE PERFORMANCE USING NONLINEAR PUSHOVER METHOD

By : Puput Risdanareni
Student Identity Number : 3107202007
Supervisor : Tavio, S.T., M.T., Ph.D.
Co-Supervisor : Ir. Aman Subakti, M.S.

ABSTRACT

This research describes influence of nonlinearity model and building span to the building performance. In this research, there were three three-dimensional structure models with the span variations \( \frac{b}{l} \) of 1; 1.5; and 2, where \( b \) is the building span in \( X \) direction and \( l \) is the building span in \( Y \) direction. The height of the buildings are all 56 meters (14 floors). The effects of material nonlinearity is taken into account by introducing the Cussons Paultre confined concrete stress strain model. The method used for structural analysis due to earthquake is the nonlinear static pushover analysis. The method use for analyzing the performance levels of structures are the capacity method and the target displacement method.

Results obtained from the nonlinear static pushover analysis indicated that when the ratio \( \frac{b}{l} \) the building increases, the ductility value of the structure will be decreasing. The building which adopting Cussons Paultre stress-strain curve has 2 to 3 times higher ductility value than that of the building which designed by FEMA 356. The performance level of all structures analyzed based on the capacity spectrum method using ATC 40 is the Damage Control (DC). Whereas the performance level of the structure analyzed by the target displacement method of FEMA 356 is Immediate Occupancy (IO). The analysis using the capacity method (performance point) of ATC 40 is more accurate to express the different of structural performance level by using the effect of nonlinearity rather than by using the target displacement method of FEMA 356.

Keywords : 

\textit{Cussons Paultre stress-strain curve, Ductility, Nonlinear static pushover analysis, Performance level, Performance point method, Target displacement method}