Effect of Ductility Class on The Earthquake Performance of RC Structures

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ABSTRACT

These days, assessing a structure's seismic performance is crucial. Modern structural design mandates the use of ductility, which reduces costs while boosting overall safety. A structure's ductility can be increased by allowing a piece of it to be damaged. The goal of this study is to discover the best ductility provisions for constructions. According to EBCS EN 1998-1:2014, G+4, G+8, and G+12 reinforced concrete buildings constructed as high- and medium-ductility-class structures on strong rock (Ground type A) were compared in an analytical study. EBCS EN 1998-1:2014 specifies the criteria and requirements for using capacity design principles in the building's design. ETABS software was used to conduct a performance evaluation of the buildings after they had been designed to withstand an oncoming earthquake. The capacity curve, story displacement, inter-story drift, and plastic hinge distribution of the building are used to evaluate the seismic performance of the building. As the ductility increase from DCM to DCH the result becomes (i) base shear increased by 7.89%, 9.62% and 4.21% and increased by 8.02%, 11.5% and 5.19% along in the X and Y direction respectively. (ii)Top Displacement is increased by 21%, 18.96%and 13.65% and increased by 18.59%, 14.18% and 12.52% along in the X and Y direction respectively. (iii) Inter Story drift increased by 17.92%, 20.68% and 13% and increased by 17.7%, 11.97% and 22.96% along in the X and Y direction respectively. (iv)Plastic hinge distribution at the last step of pushover analysis at the range greater than CP in DCM is higher than DCH and at the performance points the performance of the three sample buildings become IO but the number of plastic hinges distribution on level A-B and B-C are not identical for DCM and DCH.

Keywords: *Ductility Class, Performance Level, Plastic Hinge, Pushover Analysis*

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