

Evaluation of Earthquake Induced Cost for Mid-Rise Buildings

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Abstract : This paper mainly focuses on performance assessment of buildings by associating the damage level with the damage cost. For this purpose a methodology is explained and applied to the representative mid-rise concrete building residing in Izmir. In order to consider uncertainties in occurrence of earthquakes, the structural analyses are conducted for all possible earthquakes in the region through the hazard curve. By means of the analyses, probability of the structural response being in different limit states are obtained and used to calculate expected damage cost. The expected damage cost comprises diverse cost components related to earthquake such as cost of casualties, replacement or repair cost of building etc. In this study, inter-story drift is used as an effective response variable to associate expected damage cost with different damage levels. The structural analysis methods performed to obtain inter story drifts are response spectrum method as a linear one, accurate push-over and time history methods to demonstrate the nonlinear effects on loss estimation. Comparison of the results indicates that each method provides similar values of expected damage cost. To sum up, this paper explains an approach which enables to minimize the expected damage cost of buildings and relate performance level to damage cost.

Keywords : expected damage cost, limit states, loss estimation, performance based design

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