PUSHOVER ANALYSIS OF R/C SETBACK BUILDING FRAMES

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ABSTRACT

The behaviour of a multi-storey framed building during strong earthquake motions depends on the distribution of mass, stiffness, and strength in both the horizontal and vertical planes of the building. Irregular configurations either in plan or elevation were often recognised as one of the main causes of failure during past earthquakes. A common type of vertical geometrical irregularity in building structures arises from abrupt reduction of the lateral dimension of the building at specific levels of the elevation. This building category is known as the setback building.

Pushover analysis is a nonlinear static analysis used mainly for seismic evaluation of framed building. Conventional pushover analysis outlined in FEMA 356:2000 and ATC 40:1996 is limited for the buildings with regular geometry. There is no research effort found in the literature to use this analysis procedure for setback building. It is instructive to study the performance of conventional pushover analysis methodology as well as other alternative pushover methodologies for setback buildings and to suggest improvements suitable for setback buildings. This is the primary motivation underlying the present study.

In the present study an improved procedure for estimating target displacement of setback buildings is proposed. This proposal is a simple modification of the displacement coefficient method as outlined in FEMA 356: 2000. The nonlinear static analyses or pushover analysis carried out by mass proportional uniform load pattern and proposed modification in target displacement estimation procedure consistently predicting the results close to that of nonlinear dynamic analyses.

KEYWORDS: Pushover Analysis, Setback Building, Plane Frames.