

# Study Of Inelastic Behaviour Multistorey RC Vertically Irregular Framed Building

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**Abstract-**Occurrence of the earthquake is unpredictable, but we can adopt preventive measures to overcome problems during earthquake. In this case, various organizations in the earthquake threatened countries have come up with documents, which serve as guidelines for assessment of the strength, expected performance and safety of existing buildings as well as for carrying out the necessary strengthening required. The present paper deals with detailed discussions on non-linear static analysis methods various structural performance levels of building. Seismic evaluation followed by information about various strengthening techniques for beam and column. The study includes the Pushover Analysis of G+6 storey building using SAP 2000 with default and user-defined hinges. And conclude that model with user-defined hinge properties is more successful for capturing hinging mechanism.

## 1. INTRODUCTION

Earthquake is a shaking of ground caused by sudden breaking and shifting of large rock outer shell. Earthquakes are among the most powerful events on the and their results can be terrifying scientist estimate that more than 8000 minor earthquakes occur daily without causing any of damage. Of these only about 1100 are strong enough to felt. The world's deepest earthquake occurs in subduction a zone down to depth about 700 km. below that depth of the rock is too wormed and soft to break suddenly and cause earthquakes. Quake vibrations are also intense that they turn into jelly (liquefaction). The violent ground motion pushes the building rapidly from the one direction to another making it difficult to super structure to constantly balance its load resulting in collapse of structure.

As per 1935 surveys India has been divided into five zones if structure comes in critical earthquake zone. Then it is very essential to take account of seismic forces which are mentioned in I.S. 1893-2002 [26] otherwise there will be more possibility of loss of life and property. If self never kills the people it is the body constructed buildings that kills. There number of reasons which do not permit the adoption of seismic design like Lack of concern due to frequent occurrence of earthquake, lack of awareness, Lack of financial resources, Lack of skill in seismic analysis and design and construction techniques and unorganized nature of building sector. Seismic from countries like Japan alone has 5000 quake student and India only have 100.

The loss of life mainly due to collapse of structure. The collapse of structure may be due to insufficient design, supervision, and irregularity in plan, stiffness irregularity, mass irregularity, and strength irregularity etc.

## 2. SYSTEM DEVELOPMENT

➤ **Seismic Methods of Analysis:-** Once the structural model has been selected, it is possible to perform analysis to determine the seismically induced forces in the structures. The analysis process can be categorized on the basis of three factors: the type of externally applied loads, the behavior of the structure or structural materials, and the type of structural model selected.

➤ **Response Spectrum Method:-** Three dimensional space frame analyses of two configurations of hill buildings

involving the effect of plan aspect ratio have been carried out by parametrically varying plan and height of the models. The seismic analysis is carried out by using equivalent static approach and response spectrum method using finite element code ETABS v 16.0, and seismic parameters such fundamental time period, maximum top story displacement, story shear, story drift and column shear at ground level in each direction, i.e. along slope and across slope of hill, are determined using SRSS modal combination and compared within the considered centre the survey point in the optical plumbmetreticle. Centre the bubble in the circular level by adjusting the tripod legs. Loosen the configurations

➤ **Seismic Evaluation -** The aim of seismic evaluation is to assess the possible seismic response of buildings, which may be seismically deficient or earthquake damaged, for its possible future use. The evaluation is also helpful for adopting the retrofitting of structure.

## 3.GENERAL AND ARCHITECTURAL DESCRIPTION FOR ANALYSIS MODELS

Earthquake response analysis is an art to simulate the behavior of a structure subjected to an earthquake ground motion based on a mathematical model of the structure. The correct analysis will depend upon the proper modeling of the behavior of materials, elements, connection of structure. Therefore, it is important to select an appropriate and simple model to match the purpose of the analysis. Because of the difficulties in modeling, verification and numerical calculation, mostly one dimensional or two dimensional models are commonly used.

## 4.OBJECTIVES OF THE STUDY AND METHODOLOGY

When two points are given.

- To carry out Response spectrum analysis of frames without MI and to carry out Response spectrum analysis of frames with MI
- To carry out Response spectrum analysis of geometrically vertical regular frame and to carry out Response spectrum analysis of Geometrically vertical irregular frame.

## 5. CRITERIA FOR VERTICAL IRREGULARITIES IN BUILDING CODES

In the earlier versions of IS 1893 (BIS, 1962, 1966, 1970, 1975, 1984), there was no provision of vertical irregularity in building frames. However, in the recent version of IS 1893 (Part 1)-2002 (BIS, 2002) [26], irregular configuration of buildings has been defined explicitly. Five types of vertical irregularity have been listed as shown in Figure 1.1. They are: stiffness irregularity (soft story), mass irregularity, vertical geometric irregularity (set-back), in-plane discontinuity in lateral-force-resisting vertical elements, and discontinuity in capacity (weak story).

NEHRP code (BSSC, 2003) [27], has classifications of vertical irregularities similar to those described in IS 1893 (Part 1)-2002 (BIS, 2002) [26]. As per this code, a structure is defined to be irregular if the ratio of one of the quantities (such as mass, stiffness or strength) between adjacent stories exceeds a minimum prescribed value. These values (such as 70-80% for soft story, 80% for weak story, and 150% for set-back structures) and the criteria that define the irregularities have been assigned by judgment. Further, various building codes suggest dynamic analysis (which can be elastic time history analysis or elastic response spectrum analysis) to come up with design lateral force distribution for irregular structures rather than using equivalent lateral force (ELF) procedures.

## 6. IMPORTANCE OF NON-LINEAR STATIC ANALYSIS

The Response spectrum analysis can be considered as a series of incremental static analyses carried out to examine the non-linear behavior of structure, including the deformation and damage pattern. The procedure consists of two parts. First, a target displacement for the structure is established. The target displacement is an estimate of the seismic top displacement of the building, when it is exposed to the design earthquake excitation. Then, a Response spectrum analysis is carried out on the structure until the displacement at the top of the building reaches the target displacement. The extent of damage experienced by the building at the target displacement is considered to be representative of the damage experienced by the building when subjected to design level ground shaking. A judgment is formed as to the acceptability of the structural behavior for

the design of the new building, or the level of damage of an existing building for evaluation purposes.

## 7.CONCLUSION

In present work to study the dynamic behavior of the structure total five analytical models of 14-storey RC frame buildings have been investigated for the effect of masonry infill wall and the effect of vertical geometric irregularity.

The infill walls contribute significantly to the stiffness of the building. This is primarily due to infill increases lateral resistance and initial stiffness of the frames and have a significant effect on the reduction of the global lateral displacement. It is essential to consider the effect of masonry infills for the seismic evaluation of moment resisting RC frames, and new RC frame, especially for the prediction of its ultimate state.

## REFERENCES

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