A Review on Dynamic Analysis of RCC Structure

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Abstract— For multi-storied buildings under earthquake seismic forces, if not well designed and constructed properly with and adequate strength it leads to complete collapse of the structures. To ensure safety against seismic forces of multi-storied building, there is need to study of seismic analysis to design earthquake resistance structures. Objectives of this paper are to study the seismic analysis of a structure for dynamic analysis and static analyses in moment resisting frame. Time history method and response spectrum analysis are the methods used in structural seismic analysis, considering the residential multi-storied model for the seismic analysis located in zone II. The total structure was analyzed by computer with using STAAD.PRO software.

Key words: STAAD.PRO software, SMRF, RCC Structure

I. INTRODUCTION

Earthquake causes different shaking intensities at different locations and the damage induced in buildings at these locations is also different. Thus, there is necessary to construct a structure which is earthquake resistance at a particular level of intensity of shaking a structure, and not so much the magnitude of an earthquake. Even though same magnitudes of earthquakes are occurring due to its varying intensity, it results into dissimilar damaging effects in different regions. Therefore, it is necessary to study variations in seismic behavior of multistoried RC framed building for different seismic intensities in terms of various responses such as lateral displacements and base shear (Duggal, 2010)[1].

Due to the nature of earthquake, a design philosophy has been adopted to design a building in earthquake prone regions. The buildings which do not fulfill the requirements of seismic design, may suffer extensive damage or collapse. The seismic evaluation reflects the seismic capacity of earthquakes vulnerable buildings for the future use. The main objective of this paper is to study the seismic behaviour of a multi-storied reinforced building. Also, analysis of structure by using time history method and response spectrum method. The story displacement result has been obtained by using both method of dynamic analysis and static analysis. The pertaining structure of a multi-storied buildings has been modelled. The building has been analysed by using the time history method and response spectrum and using software's.

II. LITERATURE REVIEW

E. Pavan Kumar et al. [2]did a case study on earthquake analysis on a multi-storied building of a 16 storied building analyzed using STAAD PRO software. The main objective this paper is to study the seismic analysis of structure for static and dynamic analysis in ordinary moment resisting frame and special moment resisting frame. Observing the result of the case study he concluded that the performance of dynamic analysis SMRF structure is quiet good in resisting the earthquake forces compared to that of the static analysis. Dr. S.K Dubey IJER et al. [3] explained the loads subjected to a structure due to earthquake forces using a 20 storied model analyzed using STAAD PRO. The objective is to study the seismic effects of earthquake on the model through time history method and response spectrum method. He concluded that time history method is economically better for designing. Mohit sharma IOSRJ et al. [4] using a 30 storied model of a structure h has studied the comparison of static and dynamic analyses on STAAD PRO under various forces such as live load, dead load, wind load etc. He proved that at same points and conditions displacements for dynamic analyses is higher than static analyses. Mahesh N Patil IJEIT et al. [5]this paper consists of a comparative study between the manual analyses and using ETAB software for a multi-storied building. An 8 storied building is considered acting under dead load, live load, earthquake load etc. He proved that the results of seismic weight by both manual analysis as well as software analysis gives exactly same result, but you may observe a slight variation in the values of base shear in manual as well as software analysis.

III. METHODOLOGY

A. Time History Method

Time history method is also known as a nonlinear dynamic analysis. It requires a time history of the earthquake for the respective regions to perform analyses related to a structure being evaluated. It is depended on time and the response is measured at every increment under the effect of seismic forces.

There are two problems mentioned in it as follows

1) It is difficult to us earthquake as loading.
2) Generally too computer intensive especially in elastic analysis.

B. Response Spectrum Method

Response spectrum method is also known as linear dynamic analysis and is depended on the response of earthquake forces. In this method, peak response of a structure under earthquake effect is obtained directly from the earthquake response. This peak response is then combined to estimate a total response. A typical combination method is the square root of the sum of the squares if the modal frequencies are not closed. The main limitation of response spectrum is that it is universally applicable for linear system.

IV. CONCLUSIONS

After comparison of the results of static and dynamic analyses under axial, torsion, bending moment it is observed that the static analyses values are low comparatively as a result dynamic analyses has better resistance to the earthquake forces. While on the other hand the competition of Time

history method and Response spectrum method, time history method is proved to be economically better in the analyses than that of the response spectrum method as it has a greater base shear.

The experimental study of the manual conventional method of a multi-storied building and the same model as a computer intensive software studies shows that the calculations of seismic weights on the structure in both the methods results to be the same. But you can also notice a slight variation in the values of base shear in manual as well as software methods.

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