TIME HISTOREY ANALYSIS USING FNA METHODOLOGY FOR COMPARION BETWEEN SHEAR WALL AND FVD MODEL

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Abstract – *To make the building structures earthquake resistant, various methods are adopted against which application of fluid viscous dampers (FVD) is most recent one.*

But after most studies on this method it was found that there is need to optimize its uses to make it cost effective. This paper gives some idea about to optimize the use in FVD in building and also n comparison with shear wall. In this study RCC frame buildings models, with bare frame and with FVD also with shear wall prepared in ETABS, was studied against four time history records of maximum displacements, storey shear, storey drifts of the various models are compared to final out optimal location in between shear walls and FVD. This study observes that to reduce seismic response of the building FVD or shear wall which will be the most effective and comparison of the various models gives the most suitable.

***Key Words*: Conventional structure, Damper structure, Shear wall wall, Damper and Shear wall structure, Storey displacement, Storey drift, Storey shear, ETABS.**

1. INTRODUCTION

The techniques to resist the earthquake effects over buildings which were used during last few decades has been substituted by using new improved control technique. These are provided to vanish of seismic loads on the structures. There are various other tools to provide resistance to the building over these disasters effects such as friction damper, fluid viscous damper, viscoelastic damper, metallic yield damper etc. These tools are used in construction of structures with different technologies so as to minimize the effects caused by earthquakes and energy excitation by seismic waves. Fluid viscous dampers are one of the most demanding tools for the seismic load response.

Recently many investigations and heavy cost have been paid for analyzing the effects of seismic waves on the buildings with the installation of various dampers with the purpose of decreasing damage caused by earthquake. There are many more changes done in the research centers to improve the traditionally used damper devices which are used in dissipation of the energy observed by the seismic waves, still there is an increase in and scale. Viscous damper is known as energy dissipation device improving building response caused by earthquake.

1.1 Objectives

Following are the objectives to be studied:

1. In order to construct RCC model, shear wall model, damper model and damper with shear wall model using the Indian Standard code 1893:2002.
2. The place considered for the time history analysis is barKot, and all the real time values as been delivered from the main website strong motion center.
3. The damper considers is the viscous which is derived from the respective Taylor chart, the proper value is utilized for the construction of the damper model.
4. Time history analysis has been carried out and respective PGA and PGV has been derived, along with this displacement, story drift and share also been considered and comparison is finally made for a consideration of the better performing model.

2. LITERATURE REVIEW

Liya Mathew and C. Prabha et.al.,(2014) [1]
Entitled that effect of fluid viscous dampers in multi-storied building, This paper deals with buildings are subjected to various loading conditions. For the purpose that there should have no damage to the building due to natural calamities such as earthquakes some new and effective protective techniques are developed. The fluid viscose damper (FVD) gives importance here. This paper explains to find the most harmful properties to reinforce concrete frames. The analysis is done in symmetrical square building using SAP2000 software. Results are compared in graphical form.

Sachin Kukian, Mohamed Parvez, Avinash A R and Kiran Kamath et.al.,(2015) [2]
Entitled that, this paper is related to the investigation of the earthquake wave behaviour on the structures with several floors. It is done with the devices that are located in the lateral load that resist the elements of the building. The

study gives detailed information about the fluid viscous damper.

Lavanya K R, Dr. K. Manjunatha et.al., (2016) [3]
Entitled that, the most destructive earthquake of all natural disasters are floods, earthquakes, droughts, tornadoes, hurricanes. Since then, they are injured and financial losses come from a series of panic signs. Creating a design requires earthquake signals to be implemented, as earthquakes awaken. To achieve the earthquake resistant structure the best analytical methods are used, they are push over analysis, dynamic analysis, and time history analysis.

M. L. V Prasad, Endow A Mazumder et.al.,(2016) [4]
Entitled that, This paper gives information about steel structure with viscous dampers. A 3D numerical exploration is conducted by observing the seismic effects which is acting on 5 to 10 floored steel structures. This paper gives the information according to various graphs depending on non linear time and linear force versus velocity behaviour. In this paper mainly discussion was on the facts about the evaluation of inter-story drift, maximum base shear and also the maximum roof displacement. It concluded that when the structural work is increased with supplemental dampers then it improves its dissipative capacity.

A. K. Sinha Sharad Singh et.al., (2017) [5]
Entitled that, this paper describes the use and efficiency of such a device, fluid viscous dampers, to reduce the damping demand on structural system. In this paper, Analysis is performed on the 3D model of the twelve-story RCC MRF building using a 3- directional synthetic accelerometer. Building patterns with and without complimentary reduction have been carried out using ETABS. Story responses are compared to the full maximal displacement and story shear. Time history reaction plot for two models is compared to various reactions.

3. METHODOLOGY

3.1 Time History Analysis

The current study analyzes seismic signals and examination of lateral load according to seismic code IS 1893 (Part 1):2002 bare structures and adjacent structures that attempt to investigate the result of seismic load. Efficiency and need are assessed by examination of nonlinear static analysis.

This is called dynamic nonlinear analysis. This technique is also applicable for analyzing structural seismic. In order to execute such analysis, time history of seismic is needed for estimation. Time history analysis process is analyzing the structure for dynamic response of given charge.

The study of time history helpful to overcome all the defects of the continuous study of the model response. This method requires more computational effort at isolated times to measure the values. The important advantage of such a method is that it provides safety for the designing and analyzing technique mentioned by IS1893 (Part1). This is important when considering the effects of interactions between resulting stresses. The study of time history is useful for controlling complex response of structure to arbitrary charges.

3.2 Building Description

The building used in this study is Eight storied. All building models have same floor plan.

3.2.1 The data is taken for the analysis is as follows:

Grade of concrete	M35
Grade of steel	Fe550
Beam	750×650 mm
Column	750×750 mm.
One way slab	200mm
Story Height	3m

3.3 Seismic Loads

Seismic design shall be done in accordance with IS: 1893:2002. The building is situated in earthquake zone V. The parameters to be used for analysis and design are given below (As per IS: 1893:2002 (Part I).

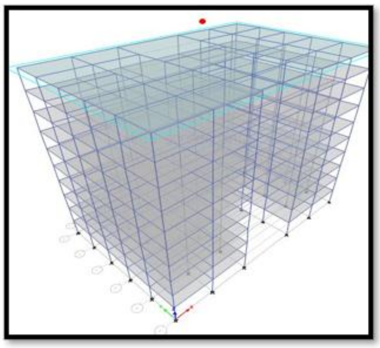
Zone	V
Zone Factor	0.36
Importance Factor	1.0
ResponseReduction Factor	**5.0**
Soil Type	Medium
Structure Type	RC Frame Structure

4. MODELLING AND ANALYSIS

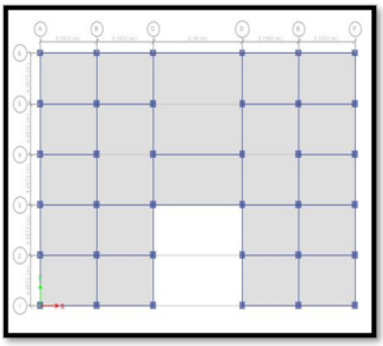
ETABS follows the basic procedure of model analysis, design and detailing through the following steps.

1. Start up with ETABS
2. Set up grid lines
3. Selection and defining the material properties
4. Selection and defining the section properties
5. Assigning the section properties
6. Defining of load patterns
7. Defining of load combinations
8. Assigning of loads analysis of model

4.1 MODELS FOR ANALYSIS

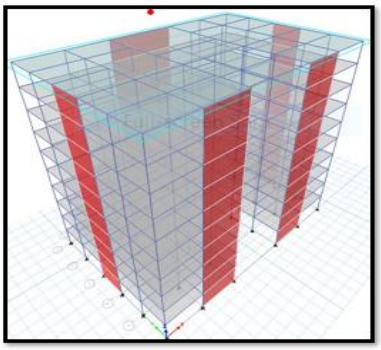


(a) : Elevation

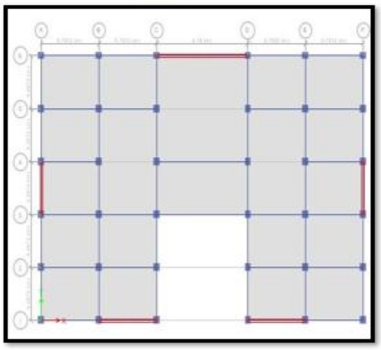


(b) : Plan

Fig -4.1: Model S1 (Conventional RC Structure)

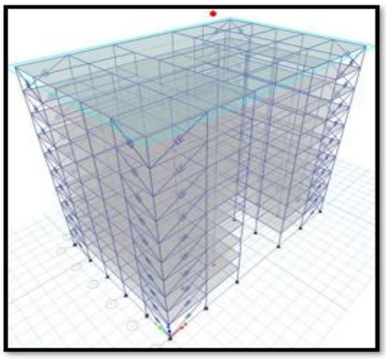


(a) : Elevation

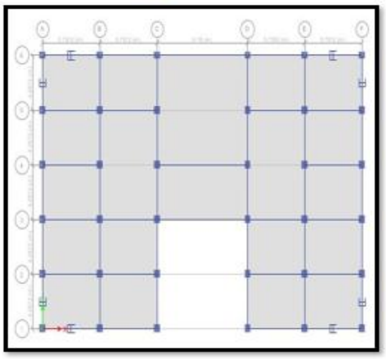


(b) : Plan

Fig -4.2: Model S2 (Shear Wall Structure)

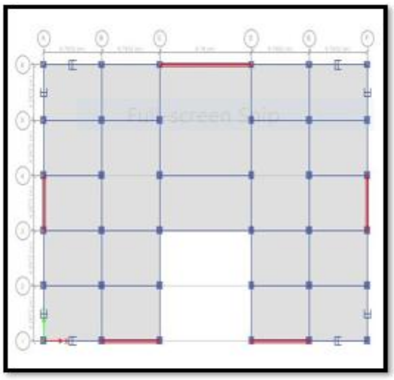


(a) : Elevation

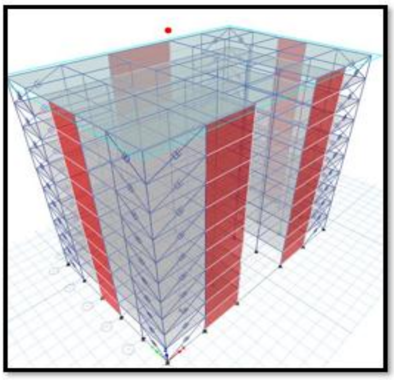


(b) : Plan

Fig -4.3: Model S3 (Damper Structure)



(a) : Plan



(b) : Elevation

Fig -4.4: Model S4 (Damper & Shear Wall Structure)

5. RESULTS AND DISCUSSIONS

5.1 Storey Displacement

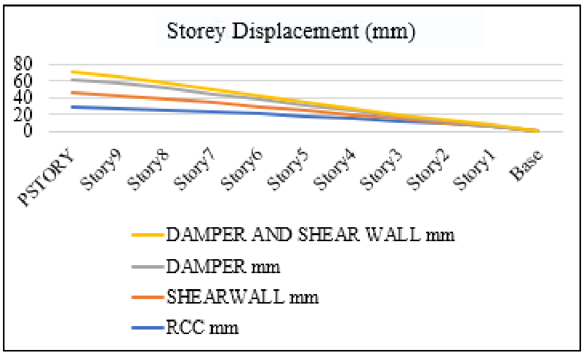


Fig -1: Storey Displacement

5.2 Storey Drift

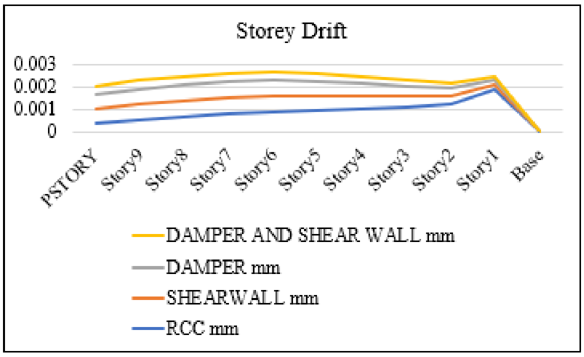


Fig -2: Storey Drift

5.2 Storey Drift

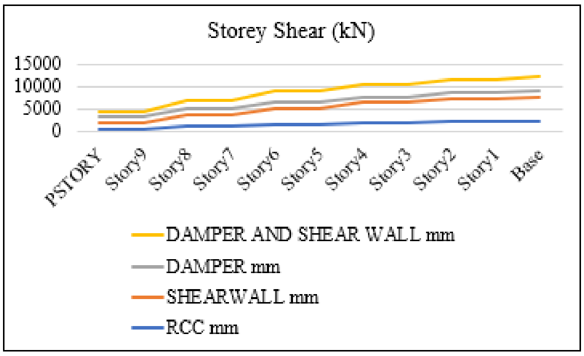


Fig -2: Storey Shear

6. CONCLUSIONS

1. By checking the comparison for displacement, drift and shear the final values obtained for the all the three reserves holds good for damper model.
2. Considering all the tables and respective graph we found that cement damper and share wall performs better when compared with all other models which is having less value and holds good to consider the damper and shear wall model model performs better.
3. Considering the forces values the damper and shear wall model model also performs better in this compare with all other hence in drift analysis the shear wall model performs better.
4. Consider in the share forces the RCC model which is the performs better damper and shear wall model appears to be a better choice hence in share consideration 4th model damper and share wall performs as an second better option for the consideration.
5. Finally seeing all the three results displacement drift and story share values we can conclude that the damper and the share wall model is better when compared with all other model. Hence in this project shear wall model is better and passes all the required criteria.

7. FUTURE SCOPE

The present study is based on the comparison of models with shear wall and with damper.

1. The place of the damper can change and the result will be compared.
2. For future tests relation can achieved in strength and stifness.
3. To study the models in various seismic areas and founding the best suitable place of coupled shear wall with damper in each zone.
4. To change place of shear wall with openings can be done by different openings.
5. Using different methods of dynamic analysis and comparing the results with manual calculations.

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