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Seismic Analysis of RC Framed Buildings using Viscous Dampers on Seismic Intensity is Very Severe

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Abstract: *Due to the scarcity of the land available we are going to construct the multistoried buildings, now a days the multistoried buildings are constructed nearby one another thus it will affects buildings during earthquake so in this paper we are analyzing the buildings with and without viscous dampers and comparing with the design elements by using the ETABS 2015.*

INTRODUCTION

Solid casing structures are the most widely recognized kind of present day building. It normally comprises of an edge or a skeleton of cement. Even individuals are bars and vertical ones are the segments. Solid Buildings structures additionally contain chunks which are utilized as base, just as rooftop/roof. Among these, the section is the most significant as it conveys the essential heap of the structure.

Strengthened solid casing structure is really an associated edge of individuals which are immovably associated with one another. These associations are called minute associations. There are likewise different sorts of associations which incorporate the pivoted associations that are for the most part utilized in steel structures, yet the solid casing structures have minute associations in practically the majority of the cases.

The solid confined structure should oppose different burdens that follow up on the structure during its life. These heaps incorporate Dead loads, live loads (forced burdens), wind loads, dynamic burdens and seismic tremor loads.

Damping

It is characterized as vitality misfortune in the reaction over the time span. Vitality dispersal includes factors, for example, materials, radiation of soil and so on. Clear comprehension of damping is required for consolidating its impact to the structure. The state of reaction bend doesn't change by damping yet the extents are diminished.

Importance of Damping

At the point when the structure has a lot of engrossing limit than the Seismic vitality then it can withstand the auxiliary harm. Proportionate thick damping can be utilized as a plausible methods for diminishing the basic harm.

Sources

The 4 different sources are Material Damping, Structural Damping, Radiation Damping and External Damping.

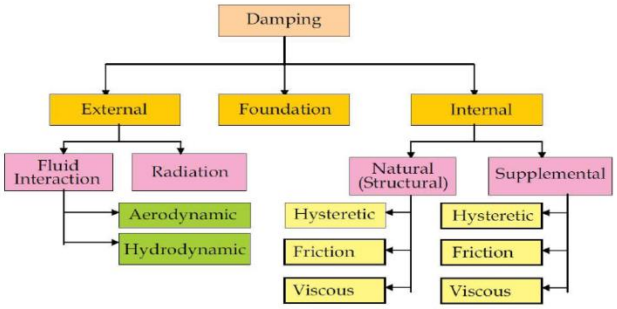


Fig 1 Sources of Damping

Viscous Dampers

In this damper, by utilizing thick liquid inside a chamber, vitality is disseminated. Because of simplicity of establishment, flexibility and coordination with different individuals additionally decent variety in their sizes, gooey dampers have numerous applications in structuring and retrofitting.

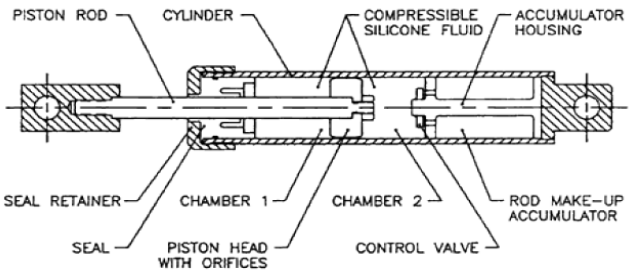


Fig 2 Longitudinal Section of Viscous Damper

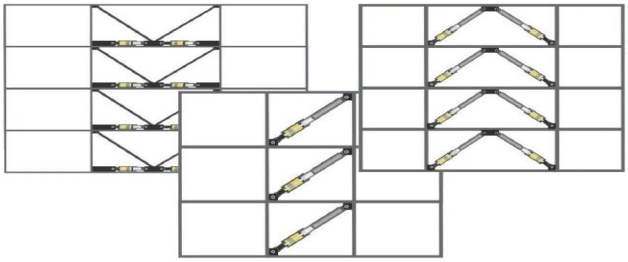


Fig 3 Viscous Damper Installation Methods

Objectives

Here in this study the analysis is carried out for a building using the viscous dampers and the following are the objectives.

- The performance of a building on an earthquake loads with and without viscous dampers.
- The dampers are placed diagonally with alternate stories to check the design elements reduction with and without dampers

REVIEW OF LITERATURE

The following are the literature reviews are carried out for the seismic analysis of RC framed buildings using viscous dampers.

Abhishek Kumar Maurya, V.K. Singh done chip away at 'Investigation of Building utilizing Viscous Dampers in Seismic Zone-V' in which he ponders about the multi-story ordinary fortified structure and their vibration parameters. It additionally manages the correlation between the seismic conduct of fixed base structure without damper to the proposed structure wherein dampers are connected at various area.

The significant ends drawn from this examination were as , the Maximum time of the structure without damper is more than both the damped models and The Viscous damper generously diminishes the timespan for structures by over half when contrasted with fixed base structure without damper structure Hence, Building having damper at Corner area gives agreeable outcome under tremor movement. Working without damper bombs under allowable story float condition and furthermore when the damper is situated at center the structure is at the very edge of disappointment in Y bearing. When contrasted with Without damper structure, the structure having damper at Corner diminishes the most extreme float esteem by85% which took corner damped working to more secure side. Working with damper at corner area gives great reaction under seismic condition and furthermore it demonstrates that without damper structure, the removal came to its pinnacle limit. Along these lines, use of damper at corner decreases the relocation by roughly 60%. Thus, Damper at corner gives agreeable outcome under seismic condition.

Anita Tippanagoudar, Dr J G Kori, Dr D K Kulkarni done chip away at 'Execution Analysis of elevated structure with Viscous Damper' in this examination is centered around adequacy of vitality dispersal gadget and parallel firmness framework.

Damper and Bracing, can be inferred that Viscous damper successfully diminishes reaction of the structure like dislodging and story float up to 70%. Much of the time building associated with gooey damper and propping likewise decreases the reaction of the structure about 65%. Supporting decreases the reaction of the structure around 35-40%. Timespan decreases around 45-55% of structure associated with thick damper and damper and propping contrasted with exposed casing. Henceforth propping the structure alongside vitality scattering gadget can adequately lessen the reaction because of normal risks and furthermore decreasing the expense of dampers.

C Rama Krishna Reddy, Vaishali G Ghorpade, H Sudarsana Rao completed work on Analysis and Deisgn of High Rise Unsymmetrical Building with Dampers in which they contemplated that the and with dampers at top story of a tall structure in redirection was diminished by giving the gooey dampers

Removal is thought about for two models i.e., without dampers zone-2& zone - 5 in each dirt and it is seen that half uprooting is diminished when the dampers are given at every rise. Shear is looked at for two models i.e., without dampers and with dampers at top story of a tall structure in zone-2& zone - 5 in each dirt and it is seen that 40% shear is diminished when the dampers are given at every rise.

METHODOLOGY

Here for examining the seismic examination of RC encircled structures utilizing gooey dampers under the extreme seismic force the models are dissected and correlations are made with and without thick dampers. The pillars and segments sizes are first planned and afterward taken for the investigation of (G+ 10) stories, the properties taken for the examination is clarified beneath.

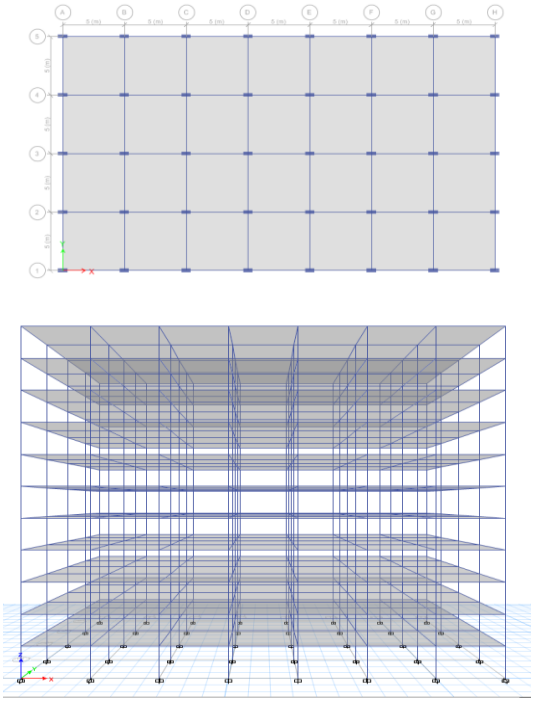


Fig 4 Plan and 3D Model of Building

Table 1 Material Properties

Density of RCC	25 KN/m^3
Density of Masonry	19.2 KN/m^3
Compressive Strength, f_{ck}	30 N/mm^2
Steel, f_y	500 N/mm^2&415 N/mm^2
Modulus of Elasticity, E_c	5000*(f_{ck})$^{0.5}$

Table 2 Data / Parameters for the analysis of Problem.

Each Storey Height	3m
Grid Spacing	5m
Wall Thickness	200 mm
Thickness of Slabs	150 mm
Size of Beams	200 x 600 mm
Size of Columns	300 x 750 mm
Building Frame System	Ordinary RC Moment Resisting Frame
Parapet Height	600 mm
Supports	Fixed

Table 3 Loading Conditions.

SLAB	**SDL** Assuming, Floor Finish = 1.5KN/m **LIVE** Considered as per IS 875 (part 2)-1987 i.e., Live Load = 3 KN/m^3
WALL	For 200 mm thick Wall load = (3-0.6) * 0.2 * 16 = 7.68 KN/m Parapet wall load = 0.6 * 0.1 * 16 = 0.96 KN/m
EARTHQUAKE LOADS	All the building frames are analysed for one seismic Zone-5, the seismic parameters for building frames are Response Reduction Factor = 5, Importance Factor = 1. Damping = 5 %, Soil Type is Medium and the fundamental natural period is 0.075*h $^{0.75}$. Where 'h' is height.

Table 4 FVD with Different Capacities Force(kN).

FORCE (kN)	TAYLOR DEVICES MODEL NUMBER	SPHERICAL BEARING BORE DIAMETER (mm)	MID-STROKE LENGTH (mm)	STROKE (mm)	CLEVIS THICKNESS (mm)	MAXIMUM CLEVIS WIDTH (mm)	CLEVIS DEPTH (mm)	BEARING THICKNESS (mm)	MAXIMUM CYLINDER DIAMETER (mm)	WEIGHT (kg)
250	17120	38.10	787	±75	43	100	83	33	114	44
500	17130	50.80	997	±100	55	127	102	44	150	98
750	17140	57.15	1016	±100	59	155	129	50	184	168
1000	17150	69.85	1048	±100	71	185	150	61	210	254
1500	17160	76.20	1105	±100	77	205	162	67	241	306
2000	17170	88.90	1346	±125	91	230	191	78	286	500
3000	17180	101.60	1441	±125	117	290	203	89	350	800
4000	17190	127.00	1645	±125	142	325	273	111	425	1088
6500	17200	152.40	1752	±125	154	350	305	121	515	1930
8000	17210	177.80	1867	±125	178	415	317	135	565	2625

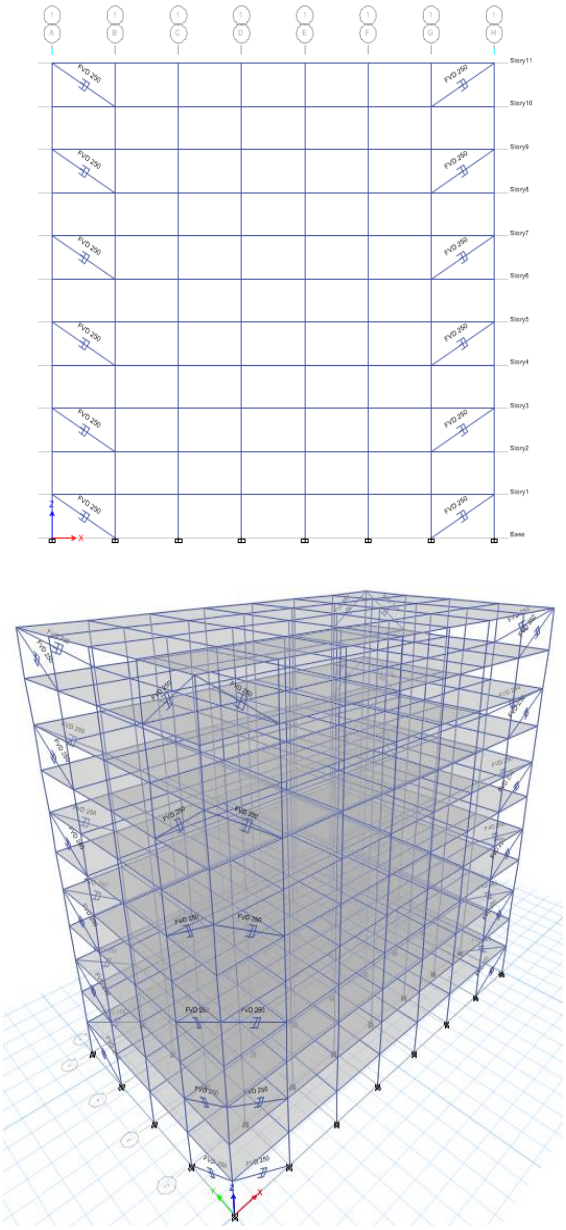
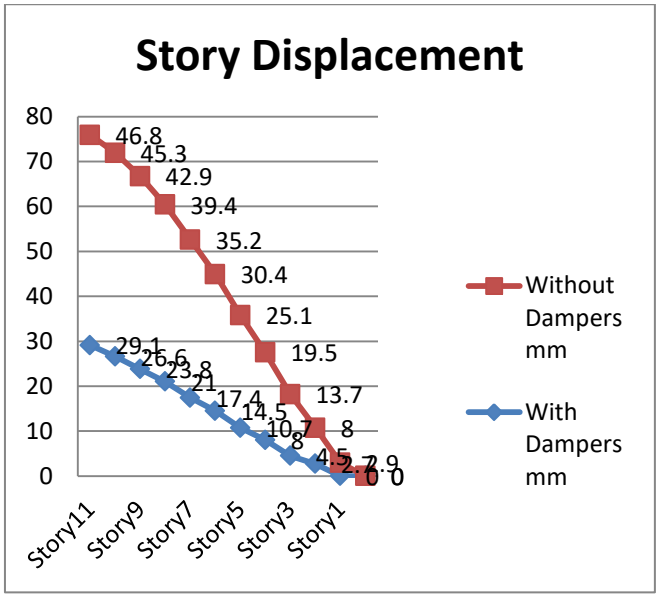


Fig 3.21 Elevation and 3D Model of Applied Fluid Viscous Damper

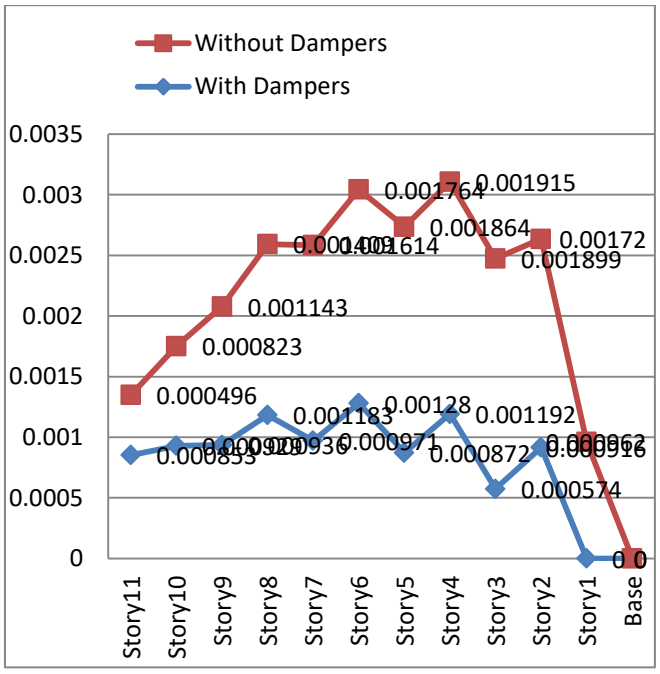
RESULTS AND DISCUSSIONS

Story Displacement



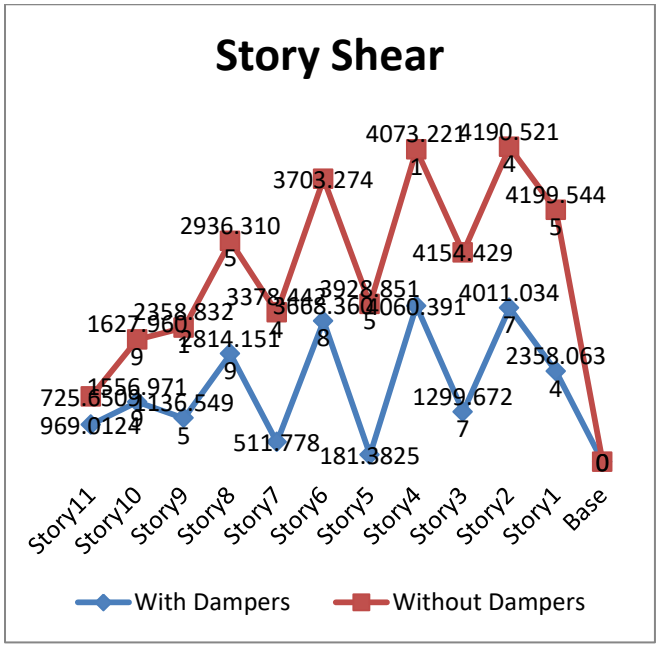
In the top story there is 37.82% decreased when the viscous dampers provided in the alternate story's.

Story Drift



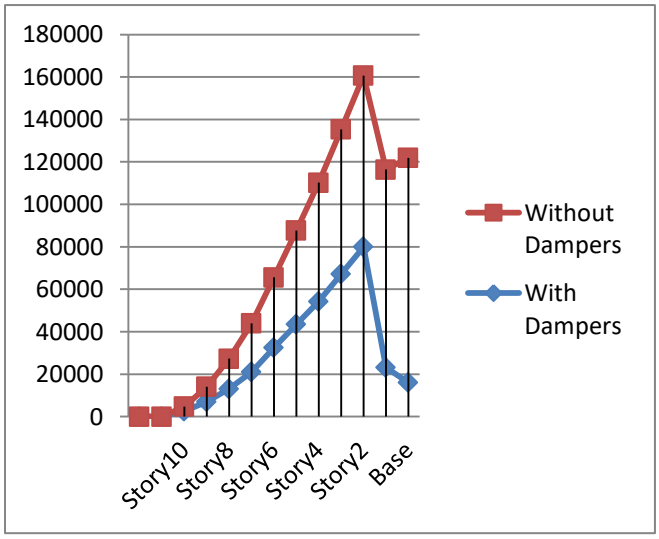
From the above it is figured out that the there is 52.86% decrease in the story 5 and 27.43% decrease in the story 6 when we use the Fluid Viscous Dampers in the buildings.

Story Shear



it is seen that the there is decrease in the story shears when we use the fluid viscous dampers in alternate stories. Here the maximum percentage in a one story is above 80% and a minimum percentage decrease in the story is 4%

Story Overturning Moment



From the above figure it is seen that there is gradual decrease in the overturning moments when we use the fluid viscous dampers in the alternate stories.

CONCLUSIONS

The models are broke down utilizing the parameters required for the examination, the gooey dampers are put exchange stories to ponder the conduct of the structure and the ends are given underneath

- The execution of the structure is demonstrated great when the liquid thick dampers are given.
- The structure components considered for the examination utilizing with and without gooey dampers, the outcomes are inside as far as possible according to the Indian Standards.
- From the outcomes it is seen that the there is decline in the structure components like relocation, float, base shear and upsetting minutes.
- There is up to 40% abatement in the removal when we utilize the liquid thick dampers in the substitute story's.
- Similarly there is most extreme half and 80% lessening in the float and base shear when we gave the liquid gooey dampers in the structures.
- In toppling minutes there is steady abatement when the thick dampers is given.

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BIOGRAPHY

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