International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 04 Issue: 10 | Oct -2020 ISSN: 2582-3930

Behavior of behavior of RC framed structures for different aspect ratios with and without viscous dampers

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ABSTRACT

Nowadays large number of buildings is being frequently subjected to the earthquakes and this has highlighted the fact of unawareness in construction of high rise building and it has triggered the concern towards the need for having earthquake resistant buildings. This paper studies about the multi-story regular reinforced building subjected to the earthquake load where viscous dampers is provided for each storey's for a different aspect ratios. G+10 building is situated in high seismic zone intensity and the analysis is performed on them to obtain the difference in structural response of the fixed RC building with and without viscous damper. Static analysis is used and done through ETABS 2015. The comparisons of different design elements are taken in to consideration.

1.1 **Keywords**: Aspect Ratios Shear, Seismic Analysis, Importance of Damping, Using E-tabs.

INTRODUCTION

A structure, or building, is a structure with a housetop and dividers standing basically forever inane spot, for instance, house or factory. Buildings show up in a grouping of sizes, shapes, and works, and have been changed since the start for a wide number of variables, from building materials open, to climate conditions, land costs, ground conditions, explicit utilizations, and elegant reasons. To all the more promptly fathom the term structures examine the summary of non-building structures.

Structures serve scarcely any social needs – on a very basic level as asylum from atmosphere, security, living space, insurance, to store assets, and to handily live and work. A structure as a safe house addresses a physical division of the human living space (a position of solace and prosperity) and the outside (a detect that once in a while might be unforgiving and destructive).

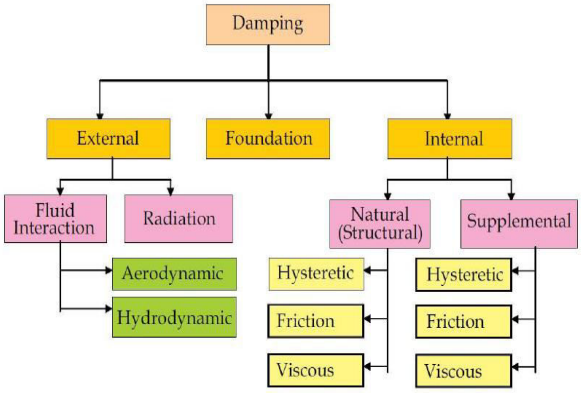
Damping

It is portrayed as essentialness disaster Ianthe response over the time period. Imperativeness dispersal incorporates factors, for instance, materials, radiation of soil, etc. Away from of damping is needed for combining its effect on the structure. The condition of response twist doesn't variably damping anyway the sizes are decreased.

IMPORTANCE OF DAMPING

Exactly when the structure has a ton of holding limit than the Seismic imperativeness then it can with stand the essential mischief. Proportionate gooey damping can be used as a potential techniques for diminishing the fundamental damage.

SOURCES



Sources of Damping

METHODOLOGY

Here for considering the seismic examination of RC surrounded structures utilizing gooey dampers underrate genuine seismic power, the models are analyzed and correlations are made with and without thick dampers. The gooey dampers are given in each Stories at corners to different level angle proportion. The poles and portions sizes are first organized and afterward taken for the investigation of (G+ 10) stories, the properties taken for the examination is clarified underneath.

Introduction to E-TABs

This joining suggests that you make only one model of the floor systems and the vertical and equal encompassing structures to examine, structure, and detail the entire structure.

The integrated components include:

- Drafting for model generation
- Seismic and wind load generation
- Gravity load distribution for the distribution of vertical loads to columns and beams when plate bending floor elements are not provided as a part of floor system
- Finite element-based linear static and dynamic analysis
- Finite element-based nonlinear static and dynamic analysis (available in ETABS Nonlinear & ultimate versions only)
- Output display and report generation
- Steel frame design (column, beam and brace)
- Concrete frame design (column and beam)
- Concrete slab design
- Composite beam design
- Composite column design
- Steel joist design
- Shear wall design
- Steel connection design including column base plates
- Detail schematic drawing generation

Modeling Cases and Procedure for Preparing the Models

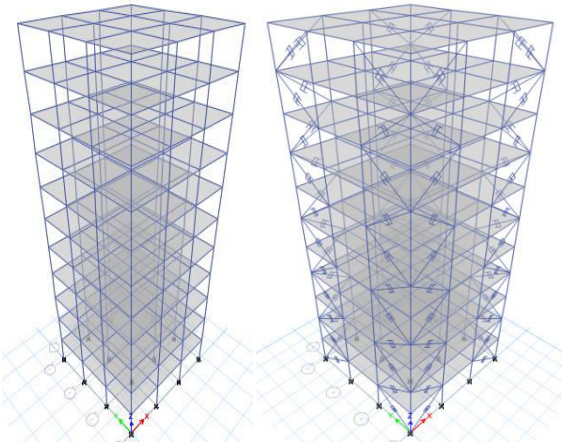
Aspect Ratios

Aspect Ratios	H.A.R. 1 (3x3 Bays)	H.A.R. 2 (6x3 Bays)	H.A.R. 3 (9x3 Bays)	H.A.R. 4 (12x3 Bays)
Grids	12x12x10	24x12x10	36x12x10	48x12x10

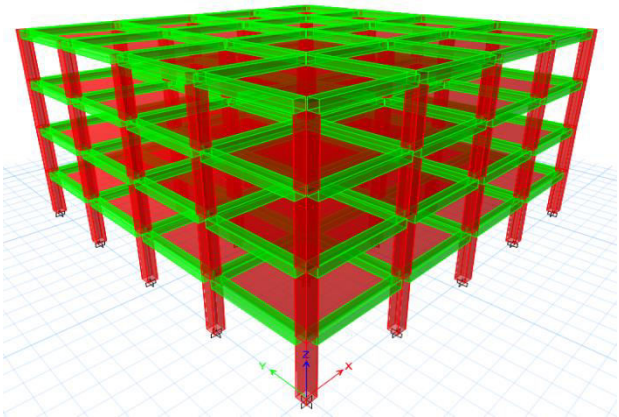
The basic assembly of RCC framed building is the slabs, beams, olumns and foundation inter-connected each other as a unit.

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&415 N/mm^2
Modulus of Elasticity, E_c	5000*(f_{ck})$^{0.5}$



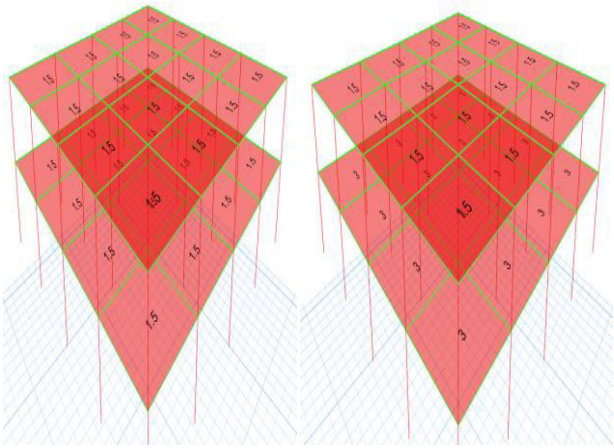
3D View of Aspect Ratio 1 with and without Dampers



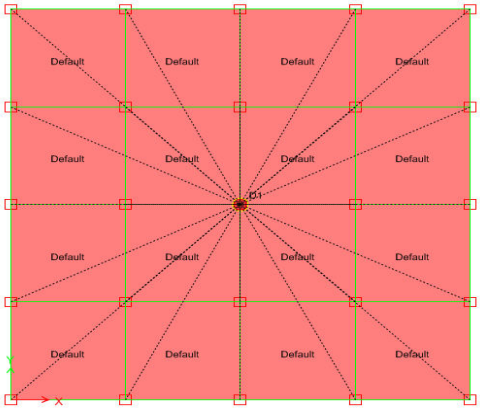
Assigned Beams, Columns and Fixity.

Load Combination Name	Load Case	Factor
DCON 1	Dead	1.5
DCON 2	Dead + Live	1.5
DCON 3	Dead + Live + EQX	1.2
DCON 4	Dead + Live - EQX	1.2
DCON 5	Dead + Live + EQY	1.2
DCON 6	Dead + Live - EQY	1.2
DCON 7	Dead + EQX	1.5
DCON 8	Dead - EQX	1.5
DCON 9	Dead + EQY	1.5
DCON 10	Dead - EQY	1.5
DCON 11	Dead + EQX	0.9 + 1.5
DCON 12	Dead - EQX	0.9 - 1.5
DCON 13	Dead + EQY	0.9 + 1.5
DCON 14	Dead + EQY	0.9 - 1.5

Loading Combinations.



Assigned loads to the Slabs.

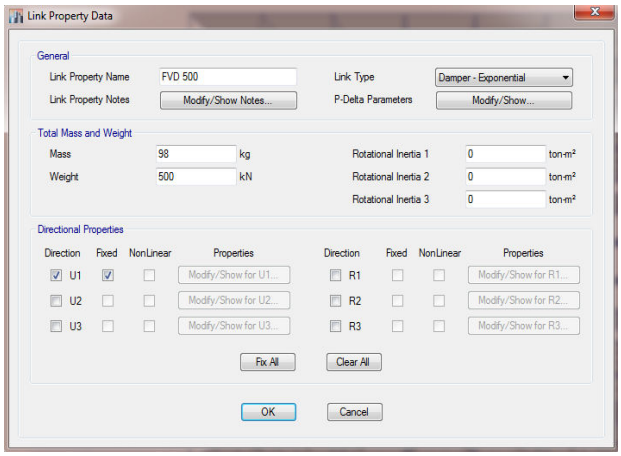


Assigned Mesh and Diaphragms.

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

FVD with Different Capacities Force(kN).

For defining the thick damper, afrom the menu bar select threadfin, select the segment properties from that select the LinkaProperties then a new window will shows up. Select the Add a new Link it shows new window and enter the subtleties as required and it is indicated below figure



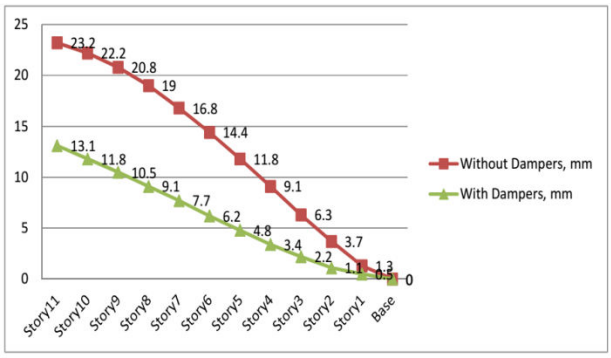
Adding New Damper Property

RESULTS AND DISCUSSIONS

Story uprooting can be characterized as "It is the dislodging of a Story concerning the base of structure.

Story	Elevation	Without Dampers, mm	With Dampers, mm
Story11	33	23.2	13.1
Story10	30	22.2	11.8
Story9	27	20.8	10.5
Story8	24	19	9.1
Story7	21	16.8	7.7
Story6	18	14.4	6.2
Story5	15	11.8	4.8
Story4	12	9.1	3.4
Story3	9	6.3	2.2
Story2	6	3.7	1.1
Story1	3	1.3	0.5
Base	0	0	0

Story Displacement

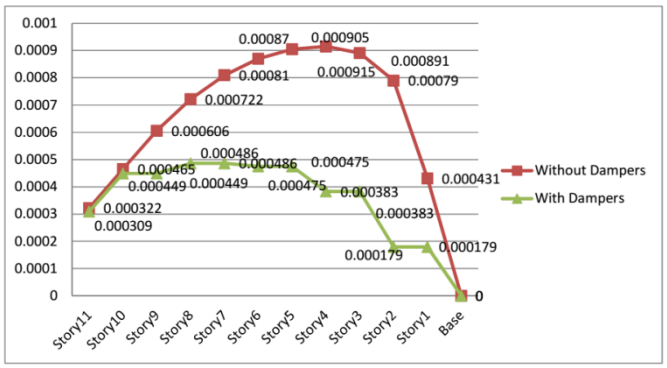


Story Displacement

It is seen that, there isa43% to 70%adecrease in every Story dislodging when we gave the gooey dampers.

Story Drift

Story	Elevation	Without Dampers	With Dampers
Story11	33	0.000322	0.000309
Story10	30	0.000465	0.000449
Story9	27	0.000606	0.000449
Story8	24	0.000722	0.000486
Story7	21	0.00081	0.000486
Story6	18	0.00087	0.000475
Story5	15	0.000905	0.000475
Story4	12	0.000915	0.000383
Story3	9	0.000891	0.000383
Story2	6	0.00079	0.000179
Story1	3	0.000431	0.000179
Base	0	0	0

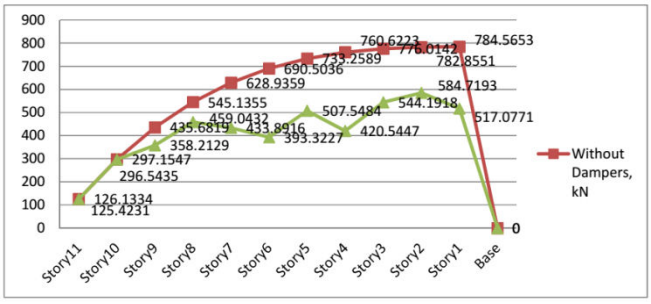


Story Drift

It is seen that, in Story 5aand 6 there is 45% to 48% abatement in the Story float when we furnished the structure with the gooey dampers in every Story.

Story Shear

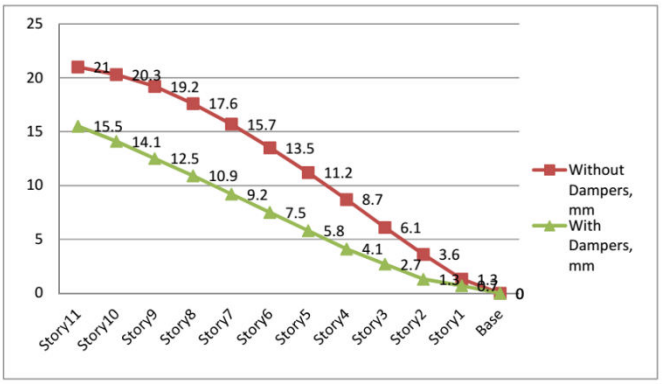
Story	Elevation	Without Dampers, kN	With Dampers, kN
Story11	33	-126.1334	-125.4231
Story10	30	-297.1547	-296.5435
Story9	27	-435.6819	-358.2129
Story8	24	-545.1355	-459.0432
Story7	21	-628.9359	-433.8916
Story6	18	-690.5036	-393.3227
Story5	15	-733.2589	-507.5484
Story4	12	-760.6223	-420.5447
Story3	9	-776.0142	-544.1918
Story2	6	-782.8551	-584.7193
Story1	3	-784.5653	-517.0771
Base	0	0	0



it is seen that, there is 17% to 45% reduction in the Story shears in Story 1 to 9 Story when we furnished with the gooey dampers in every Story.

Story Displacement

Story	Elevation	Without Dampers, mm	With Dampers, mm
Story11	33	21	15.5
Story10	30	20.3	14.1
Story9	27	19.2	12.5
Story8	24	17.6	10.9
Story7	21	15.7	9.2
Story6	18	13.5	7.5
Story5	15	11.2	5.8
Story4	12	8.7	4.1
Story3	9	6.1	2.7
Story2	6	3.6	1.3
Story1	3	1.3	0.7
Base	0	0	0



Above figure can see that the, there is 26% to 64% lessening in the Story relocation when we furnished with the thick dampers in every Story of building and there is 26% diminishing in the last Story.

CONCLUSION

For the seismic examination of building using thick dampers in each story for high seismic zone power for different perspective extents models are bankrupt down and the connections are cultivated for various structure segments and the going with closes were done up.

1. There is 43% to 70% decreasing in point extent 1, 26% to 64% decrease in context ratio2, 10% to 69% decrease in perspective extent 3 and 25% to 66% reduction in context extent 4 in the story

movement. Thusly the best decrease is in the point extent 1.

2. In story 5 and 6 there is 45% and 48% decreasing in point extent 1, 28% and 38% decrease in context extent 2, 14% to 26% decrease in perspective extent 3 and 21% to 30% reduction in context extent. From these we can see that, most extraordinary decrease is in the point extent 1.
3. For story shears, 17% to 45% decrease in perspective extent 1, 16% to 28% decrease in context ratio2, 11% to 42% reduction in point extent 3 and 6% to 56% diminishing in the viewpoint extent 4. We can see that most prominent reducing is in the perspective extent 1 when diverged from the other point extents.
4. At the point when the perspective extent extends it is seen that the there is lessening of story dislodging and story buoy and there is augmentation in the story shears. Exactly when the gooey dampers isn't given.

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