SIMULATION OF MULTYSTORY BUILDING BY STADD

Amal Pm[1], Prof. Dharmendra Singh [2]
[1]Scholar M.Tech (Structure), [2]Guide & HOD
Department of Civil Engineering, RNTU, Bhopal (M.P).

Abstract: Advances in designing new structural systems, combination of usage new materials, and increase in developments of design methods and computational software, have made possible the construction of extremely tall buildings in this era. However, the increasing in height of the high-rise building structure is a great challenge for the engineers and researchers in this field. Although there are many difficult technical problems in design, the most critical issues are definitely the effects of wind and earthquakes on these structures. The removal coasting section building is more when contrasted with without skimming segment working, on moving of drifting segment from first story towards top story of the structure brings about expanding storey drift, from dynamic investigation it was seen that gliding segment at various area results into variety in powerful reaction, It was additionally seen that moving of coasting segment from first story towards top story of the structure brings about expanding base shear.
Keywords: Floating and Non – Floating Columns, Building, EQNX, EQPY, WLX, and Storey drift, Degrees-Of-Freedom, Displacement.

1. OBJECTIVE OF THE RESEARCH WORK

The main objective of the current work is:
1. To predict the behavior of lateral stiffness.
2. To analyze the behavior of structure by optimizing the dimension of columns.
3. Vibration sensitivity prediction of different with and without floating column technique.
4. To define average natural frequency, effect of seismic zone, compressive strength and amplitude for different columns.
5. To predict vibration along the column section.

2. METHODOLOGY FLOW CHART USED

1. Finite element method
2. Procedure for finite element analysis
3. Discretization
4. Choosing the approximate solution
5. Forming the element matrix/equations
6. Assembling the matrices
7. Finding the unknown field variables
8. Types of finite element analysis
9. Experimental Investigation
10. Details of Construction Site

ARCON PROJECT PRIVATE LIMITED	
Building Construction	
Client Name	Heritage Hospitals Ltd.
Location	Varanasi
Description -	Construction of boys and girls hostel

3. RESULT ANALYSIS

It is very difficult to sum up this type of work, which contain the large amount of values and graphs. So I decided to go with floor wise summary. This will help in better understanding of my work.

In this work 2 Building (G+5) are taken into consideration with 5 flooring. One is ordinary building and the alternative is with floating column. Mainly this work will focus on the building with floating columns. Under the static loading situation both the building are safe. In dynamic load; with floating column structure is discovered dangerous. i.e. In earthquake this building observed risky. The discern beneath display the normal building without floating columns bending second, shear pressure and axial force while the constructing is beneath any kind to loading condition.

In load path in moment frames arises with set-back columns, i.e., when a column coming from top of the building is moved away from its original line, again usually at the ground storey. In such cases, loads from the overhanging portions take detour and cause severe stress concentration at the re-entrant corners while traveling to the nearest set-back column.

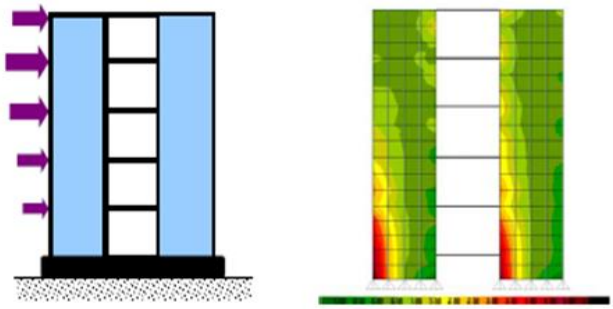

Figure 4.4 CAD model with axial force and its Principal Stresses

 Copyright 2021. All rights reserved.

Buildings set to oscillation by earthquake shaking eventually come lower back to rest with time. This is because of dissipation of the oscillatory electricity via conversion to different types of strength, like warmness and sound. The mechanism of this conversion is called damping. In normal ambient shaking of building, many elements impede its motion, e.g., drag from air resistance around the building, micro cracking of concrete within the structural participants, and friction between numerous interfaces inside the building (like masonry infill partitions and RC beams and columns). This damping is called structural damping.

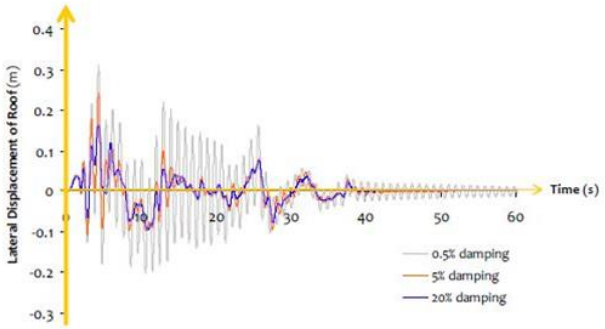

Figure 4.5 Effect of damping amplitude of oscillation reduces with increase in damping

The Study is to examine the outcomes of the constructing with and without floating columns and locating out the ultimate function of the floating column for the favored consequences amongst all of the instances taken into consideration. The parameters used for comparison are displacements, bending second, shear force and area of reinforcement.

4. BUILDING PARAMETERS

4.1 Parameters was to create the cad models and experimental model

Utility of Building	Commercial & Residential Building
Number of Stories	G+5
Geometry of Building	Symmetric
Type of Construction	RCC framed
Type Of Walls	Brick walls
External walls	0.20m
Internal walls	0.10m
Floor to floor height	3.0 m
Height of the plinth	2.0 m above the ground
Grade of Concrete	M25
Grade of Steel	Fe 500

Table: IS Codes considered for Investigation

IS 8888	Building Construction
IS 4926:2003	Ready-Mixed Concrete and Cement and Concrete
IS 8198	Steel bars

LATERAL DISPLACEMENT DUE TO EQPX

Table 4.2 Lateral Displacement Due To EQPX

Stories	With FC	Without FC
1	0.000659	0.000356
2	0.001219	0.000616
5	0.001429	0.000948
4	0.001822	0.001455
5	0.001865	0.001485

The study presented in the paper compares the difference between normal building and a building on floating column. The following conclusions were drawn based on the investigation

1) By the software of lateral loads in X and Y course at each floor, the lateral displacements of floating column constructing in X and Y instructions are more compared to that of an ordinary constructing. So the floating column building is risky for construction whilst in comparison to a regular building

2) By the calculation of storey drift at each floor for the homes it's miles discovered that floating column constructing will go through severe storey flow than ordinary constructing. The storey go with the flow is most at 5th ranges in both the instances.

3) The building with floating columns skilled more storey shear than that of the ordinary constructing. This is because of using extra quantity of substances than a everyday building. So the floating column building is uneconomical to that of a ordinary constructing

4) The very last end is that do not opt to assemble floating column in buildings unless there may be a proper motive and purposeful requirement for the ones. If they're to be supplied then right care have to be taken at the same time as designing the structure

PLOT OF RESPONSE OF BUILDINGS FOR TIME HISTOREY ANALYSIS

Two cases have been considered to plot the response of building for the time history analysis.

 Copyright 2021. All rights reserved.

Case I: Without floating column for earthquake

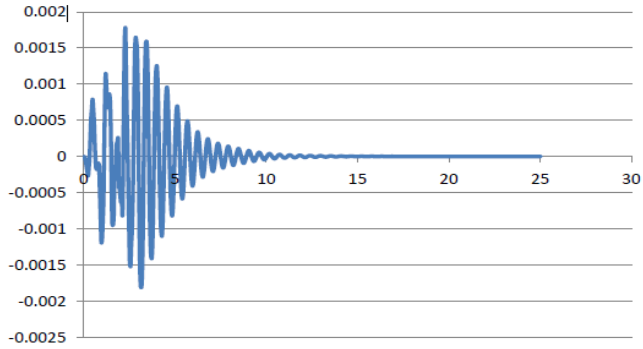

Figure 4.14 Plot of graph Displacement (on y axis in M) Vs. Time (on x axis in sec)

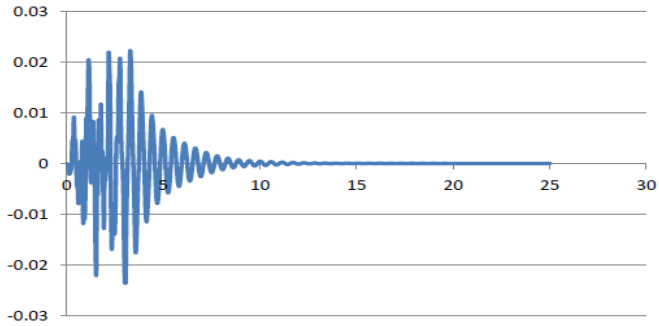

Figure 4.15 Plot of graph Velocity (on y axis in m/sec) Vs. Time (on x axis in sec)

Case II: Floating column at 1st floor for earthquake

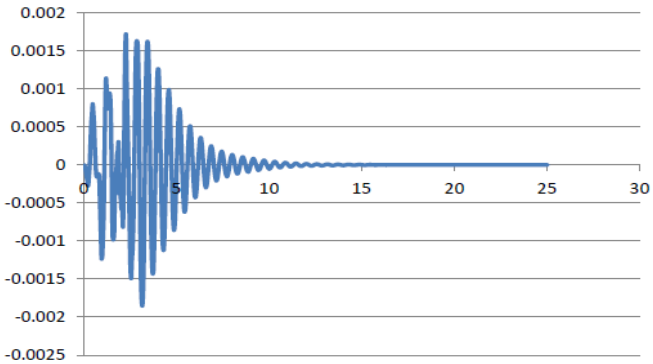

Figure 4.16 Plot of graph Displacement (on y axis in M) Vs. Time (on x axis in sec)

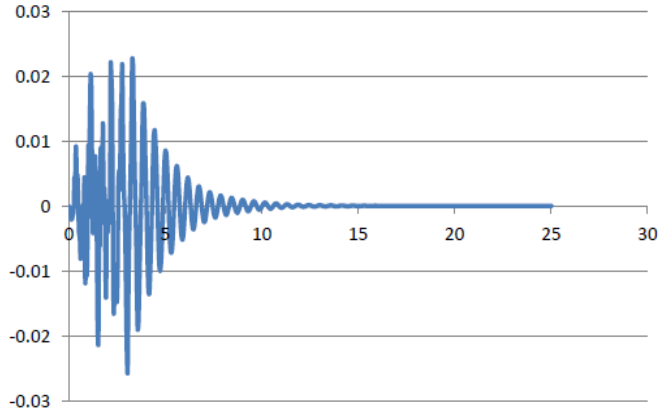

Figure 4.17 Plot of graph Velocity (on y axis in m/sec) Vs. Time (on x axis in sec)

Case III: Floating column at 2nd floor

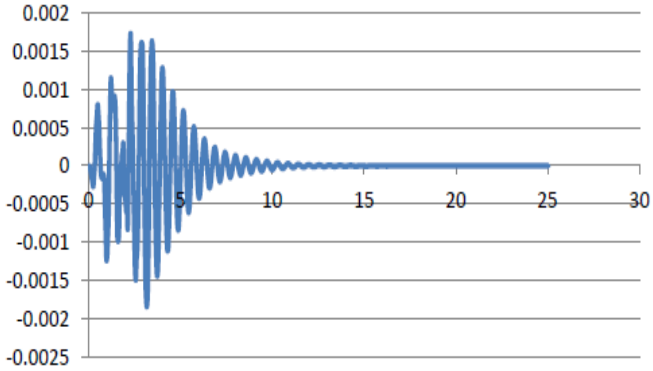

Figure 4.18 Plot of graph Displacement (on y axis in M) Vs. Time (on x axis in sec)

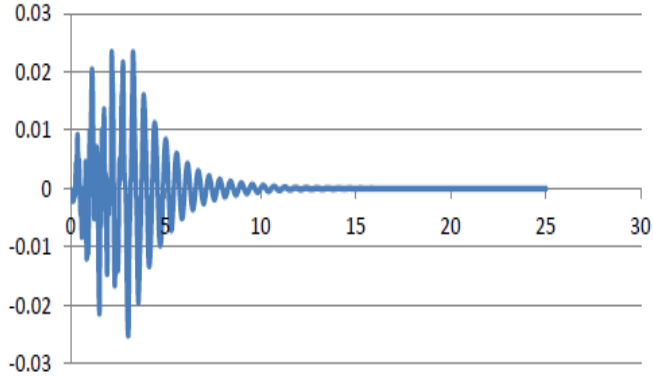

Figure 4.19 Plot of graph Velocity (on y axis in m/sec) Vs. Time (on x axis in sec)

5. GENERAL CONCLUSION

The simulation study has been done to study the displacement, acceleration and mode shape for the building structure based on the random excitation. The objective of the simulation study to obtain the result of the displacement, acceleration and mode shape for the three degree of freedom building has been achieved. The results show that in simulation study, that are conducted which the masses of the floor and stiffness are variable. Thus the result obtains shows that the third floor has the highest displacement and highest acceleration. The mode shape obtained also has been analyzes to know the movement of each floor during vibration.

5.2 FUTURE SCOPE

1) The structure with skimming segment has additional timespan when contrasted with working without gliding sections could be dissected further.
2) The moving of drifting segment towards top of the structure brings about expanding timeframe which is significantly a direct result of diminished sidelong firmness of the structure should be possible.
3) Further the structure with skimming section has less base shear when contrasted with working without coasting segment

 Copyright 2021. All rights reserved.

4) Analysis removal skimming segment building is more when contrasted with without gliding section building should be possible in reproduction.

REFERENCES

1. KirankumarGaddad ,VinayakVijapur"Comparative Study Of Multi Storey Building With And Without Floating Columns And Shear Walls"International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056Volume: 05 Issue: 07 | July-2018
2. RyoheiIshikura, NoriyukiYasufuku, MichaeJ.Brown, "An estimation method for predicting final consolidation settlement of ground improved by floating soilcement columns", Soils and Foundations www.elsevier.com/locate/sandfIssue: 07 | July-2018
3. Agbomerie Charles Odijie, Facheng Wang, Jianqiao Ye "A review of floating semi-submersible hull systems: Column stabilized unit", Ocean Engineering 144 (2017) 191–202.
4. Meghana B .S., T.H. Sadashiva Murthy "Effect Of Floating Column On The Behaviour Of Composite Multistorey Building Subjected To Seismic Load", International Research Journal of Engineering and Technology (IRJET), Volume: 03 Issue: 06 | June-2016, e-ISSN: 2395 -0056.
5. Xiao-hua Wang, "MATLAB guide to Finite Element", Springer, Berlin & New York 2016.
6. K.-W. Liu, R. Kerry Rowe, "Numerical modelling of prefabricated vertical drains and surchargeon reinforced floating column-supported embankment behaviour", Geotextiles and Geomembranes 43 (2015) 493-505
7. H. Rooholamini, A., Maherib A, Maheric Mahmoud R., Mahini S.S. (2010) "Seismic performance of ordinary RC frames retrofitted at joints by FRP sheets". Engineering Structures 32 (2010) 2326- 2336.
8. Zahran Al-Kamyani, Ronagh H.R., Kheyroddin A., (2009), "Seismic evaluation of FRP strengthened RC buildings subjected to near-fault ground motions having fling step". Composite Structures 92 (2010) 1200–1211.
9. Garcia Reyes, HajirasoulihaIman, PilakoutasKypros, (2010),"Seismic behavior of deficient RC frames strengthened with CFRP composites". Engineering Structures 32 (2010) 3075-3085.

 Copyright 2021. All rights reserved.