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Comparision Of Buildings With And Without Floating Columns By Using Staad Pro

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ABSTRACT

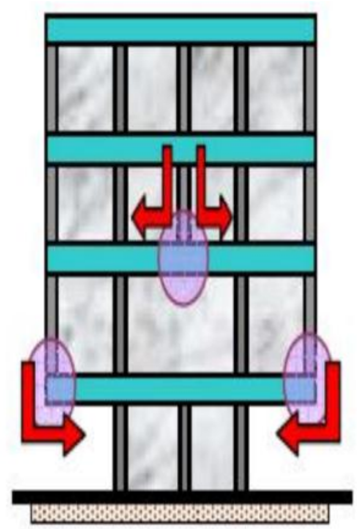
In present scenario buildings with floating column is a typical feature in the modern multistory Construction in urban India. Those characteristics are highly not suitable for buildings which were constructed in earthquake active zones. In this theses the analysis of building in the presence of floating column explicitly recognized in this involving stiffness balance of the first storey and alternative measurements are proposed to reduce the irregularity introduced by floating column. Floating columns are a typical feature in the modern multi-storied construction in urban India and are highly undesirable in buildings built in seismically active areas. This theses examines the effects of the structural irregularity which is produced by the discontinuity of a column in a building effected to earthquake loads. In this paper static analysis and dynamic analysis using response spectrum method is done for a multi-storied building with and without floating columns. By varying of locations the different cases of building of floating column floor wise and within the floor. The structural response of the building models with respect to Fundamental time period, Spectral acceleration, Base shear, Storey drift and Storey displacements is investigated. The analysis is carried out using software STAAD Pro V8i software. The frames with and without floating column the response of the structure under various seismic excitation having various frequency contents keeping the time duration factor and PGA constant are developed by FEM codes are 2D multi storey frames. The time history of floor Displacement, inter storey drift, base shear, overturning moment are computed for both the frames with and without floating column.

Introduction

This is basically being embraced to suit parking or gathering lobbies in the first Storey. While the aggregate seismic base shear as experienced by a working amid a tremor is reliant on its normal period, the seismic force distribution is subject to the distribution of solidness and mass along the tallness. The seismic tremor forces created at various floor levels in a building should be brought down along the stature to the ground by the most limited way; any deviation or irregularity in this load transfer way comes about in poor execution of the building. Buildings with vertical misfortunes (like the inn buildings with a couple of Storey more extensive than the rest) cause a sudden hop in quake forces at the level Buildings with columns that hang or buoy on beams at a middle of the road Storey and don't go the distance to the establishment, have discontinuities in the load trans

Drifting column

It is a column whose vertical part beginning from foundation level and transferring the load to the ground. The term drifting column is additionally a vertical component which at its lower level (end Level) lays on a bar which is an even part. The beams thus transfer the load to different columns beneath it.



Hanging or Floating Columns

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There are many activities in which drifting columns are received, particularly over the ground floor, where transfer supports are utilized, with the goal that more open space is accessible in the ground floor. These open spaces might be required for gathering corridor or parking reason. The transfer braces must be outlined and point by point appropriately, particularly in earth shudder zones. The column is a focused load on the bar which bolsters it. To the extent investigation is concerned, the column is frequently expected stuck at the base and is in this way taken as a point load on the transfer shaft. STAAD Pro, ETABS and SAP2000 can be utilized to do the examination of this kind of structure. Drifting columns are sufficiently skillful to convey gravity loading yet transfer support must be of sufficient dimensions (Stiffness) with extremely negligible deflection. Looking forward, obviously, one will keep on making buildings fascinating as opposed to dull. At the point when sporadic highlights are incorporated into buildings, an impressively larger amount of designing exertion is required in the basic outline but then the building may not be comparable to one with straightforward structural highlights. Subsequently, the structures effectively made with these sorts of irregular individuals are imperiled in seismic districts. However, those structures can't be decimated, rather study should be possible to reinforce the structure or some medicinal highlights can be recommended. The columns of the first Storey can be made more grounded, the firmness of these columns can be expanded by retrofitting or these might be furnished with propping to diminish the horizontal disfigurement some pictures showing the buildings built with drifting columns:

Objective and scope of present work

The goal of the present work is to think about the conduct of multi Storey buildings with coasting columns under tremor excitations. Limited component strategy is utilized to explain the dynamic administering condition. Straight time hi Storey examination is done for the multi Storey buildings under various seismic tremors loading of fluctuating recurrence content. The base of the building outline is thought to be settled. Newmark's immediate reconciliation conspire is utilized to propel the arrangement in time.

The behavior of building frame with and without drifting column is studied under static load,
Free vibration and forced vibration condition.

Static analysis

A four Storey two cove 2d outline with and without skimming segment are dissected for static loading utilizing the present FEM code and the business programming STAAD Pro.

Example 4.1

Storey height – 3.0 m
Modulus of Elasticity, E = 206.84 X 10^6 kN/m^2
Support condition – Fixed
Loading type – Live (3.0 kN at 3rd floor and 2 kN at 4 Fig. 4.1 and Fig.4.2 demonstrate the sketchmatic perspective of the two edge without and with drifting segment separately. From Table 4.1 and 4.2, we can watch that the nodal removal esteems gotten from exhibit FEM if there should be an occurrence of casing with drifting section are more than the comparing nodal relocation estimations of the casing without drifting segment. Table 4.3 and 4.4 demonstrate the nodal relocation esteem got from STAAD Pro of the edge without and with drifting section separately and the outcome are exceptionally tantamount with the outcome got in show FEM.

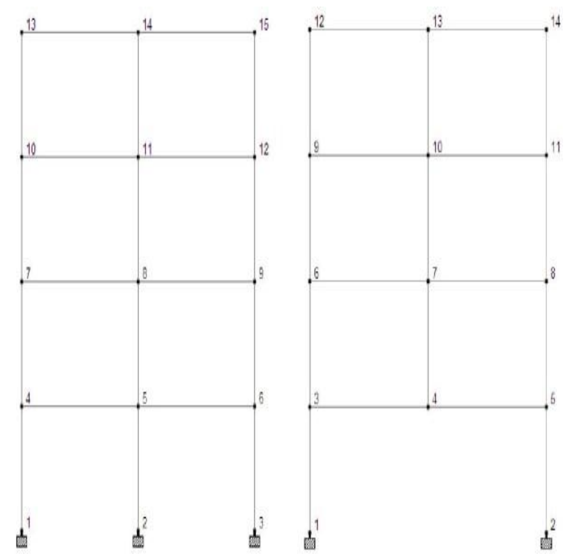

Fig. 4.1 2D Frame with usual column
Fig.4.2 2D Frame with drifting column

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Node	Horizontal(X mm)	Vertical(Y mm)	Rotational(rZ rad)
1	0	0	0
2	0	0	0
3	0	0	0
4	1.6	0	0
5	1.6	0	0
6	1.6	0	0
7	3.8	0	0
8	3.8	0	0
9	3.8	0	0
10	5.8	0	0
11	5.8	0	0
12	5.8	0	0
13	6.7	0	0
14	6.7	0	0
15	6.7	0	0

Table 4.1 Global deflection at each node For general frame obtained in present FEM

Table 4.2 Global deflection at each node
For general frame obtained in STADDPRO

Node	Horizontal(X mm)	Vertical(Y mm)	Rotational(rZ rad)
1	0	0	0
2	0	0	0
3	0	0	0
4	1.4	0	0
5	1.4	0	0
6	1.4	0	0
7	3.6	0	0
8	3.6	0	0
9	3.6	0	0
10	5.6	0	0
11	5.6	0	0
12	5.6	0	0
13	6.8	0	0
14	6.8	0	0
15	6.8	0	0

Table 4.3 Global deflection at each node for frame with drifting column obtained in present FEM

Node	Horizontal(X mm)	Vertical(Y mm)	Rotational(rZ rad)
1	0	0	0
2	0	0	0
4	1.6	0	0
5	1.6	0	0
6	1.6	0	0
7	3.8	0	0
8	3.8	0	0
9	3.8	0	0
10	5.8	0	0
11	5.8	0	0
12	5.8	0	0
13	6.7	0	0
14	6.7	0	0
15	6.7	0	0

Table 4.4 Global deflection at each node for frame with drifting column obtained in STAAD Pro

Node	Horizontal(X mm)	Vertical(Y mm)	Rotational(rZ rad)
1	0	0	0
2	0	0	0
3	0	0	0
4	1.4	0	0
5	1.4	0	0
6	1.4	0	0
7	3.6	0	0
8	3.6	0	0
9	3.6	0	0
10	5.6	0	0
11	5.6	0	0
12	5.6	0	0
13	6.8	0	0
14	6.8	0	0
15	6.8	0	0

Table 4.5 Free vibration frequency(Hz) of the 2D frame without drifting column

Fig.4.6 demonstrates the perfect time hi Storey according to spectra of IS 1893 (section 1): 2002. Fig.4.7 and 4.8 demonstrate the most extreme best floor dislodging of the 2D outline acquired in show

FEM and STAAD Pro separately.

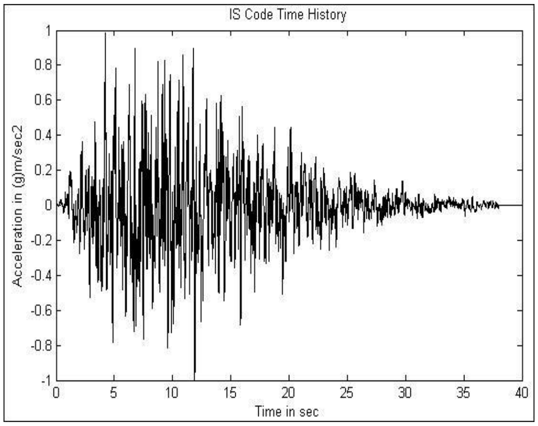

Fig. 4.6 time hi Storey

Table 4.6 anticipated recurrence (Hz) of the 2D steel outline with drifting section

Mode	STAAD Pro	Present FEM	% Variation
1	2.16	2.17	0.28
2	6.78	7.00	3.13
3	11.57	12.62	8.32
4	12.37	13.04	5.14

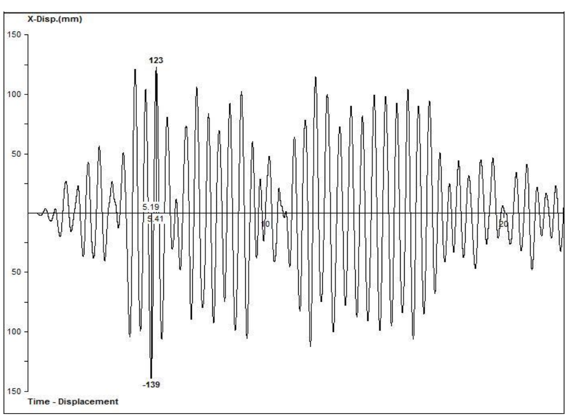

Fig. 4.7 2D steel frame with drifting column Displacement vs time response,,

Mode	Maurice Petyt [21]	Present FEM	% Variation
1	15.14	15.14	0
2	53.32	53.31	0.02
3	155.48	155.52	0.03
4	186.51	186.59	0.04
5	270.85	270.64	0.08

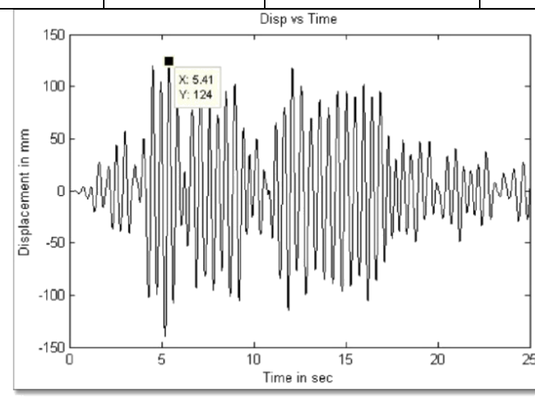

Fig. 4.8 Displacement vs time response of the 2D steel frame with drifting column

Table 4.7 anticipated recurrence (Hz) of the 2D steel outline with skimming section.

Maximum top floor displacement (mm)		% Variation
STAAD Pro.	Present FEM	
123	124	0.81

CONCLUSION

The conduct of multi Storey working with and without drifting segment is considered under various quake excitations. The good time hi Storey and Elcentro tremor information has been considered. The PGA of both the quake has been scaled to 0.2g and span of excitation are kept same. A limited component show has been created to think about the dynamic conduct of multi Storey outline. The static and free vibration comes about acquired utilizing present limited component code are approved. The dynamic examination of edge is considered by differing the section measurement. It is reasoned that with increment in ground floor section the most extreme uprooting, entomb Storey drift esteems are decreasing. The base shear and toppling moment differ with the change in section measurement.