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REVIEW ON STUDY OF BEHAVIOUR OF SEISMIC ANALYSIS OF FLOATING COLUMN FOR SEISMIC ANALYSIS OF MULTISTOREY

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Abstract - *Floating column are a typical feature in the modern multi-storey construction in urban India and are highly undesirable in buildings built in seismically active areas. In this paper static analysis is done for a multi-storey building with and with-out floating columns. Different cases of the building are studied by varying the location of floating columns floor wise. In present scenario buildings with floating column is a typical feature in the modern multi-storey construction in urban India. Such features are highly undesirable in building built in seismically active areas. Tremendous increase in the use floating column can be seen these days because of spacious and aesthetic appearance but that could not be achieved on the risk of failure of building. The structural response of the building models with respect to time period, Base shear, Storey drift and Storey displacement are compared for both building. The analysis is carried out using software sap2000v20.2.0.*

Key Words: **Floating column, seismic effects, storey drift, base shear,storey displacement,Response spectrum method, sap2000v2.0.**

1. INTRODUCTION

Many urban multi-storey buildings in India today have open first storey as an unavoidable feature. This is primarily beingadopted to accommodate parking or reception lobbies in the first storey. Whereas the total seismic base shear as experienced by a building during an earthquake is dependent on its natural period, the seismic force distribution is dependent on the distribution of stiffness and mass along the height.

column is a vertical member which rest on a beam and doesn't have a foundation. The floating column act as a point load on the beam and this beam transfers the load to the columns below it. But such column cannot be implemented easily to construct practically since the true columns below the termination level are not constructed with care and hence finally cause to failure

SAP2000 stands for STRUCTURAL ANALYSIS PROGRAMMING. SAP2000 is commonly used to analyze concrete structures, steel structures, parking garages, designing of multi-storey RCC building etc. The structural members are designed by thoroughly following IS Code and the selection of the type of construction depends on various factors including type of loading, type of structure and circumstances. Aesthetic appearance of building is also becoming a major design factor in these days.

2. LITERATURE REVIEW

1. **Maison and [2]Ventura, (1991)**, Members of ASCE computed dynamic properties and response behaviour of thirteen-storey building and this result are compared to the true values as determined from the recorded motions in the building during two actual earthquakes and shown that state-of-practice design type analytical models can predict the actual dynamic properties.

2. **Sukumar Behera (2012)** studied the behavior of multistory buildings with floating columns under earthquake excitations. Finite element method is used to solve the dynamic governing equation. Linear time history analysis is carried out for the multistory buildings under different earthquake loading of varying frequency content. The base of the building frame is assumed to be fixed. Newmark's direct integration scheme is used to advance the solution in time

3. **Ms. Priyanka D. Motghare (2016**) this paper pertains of analytical studies carried out to evaluate the performance of RCC frame under different position of floating columns. Building with a column that hangs or floats on beams at an intermediate storey and do not go all the way to the foundation, have discontinuities in the load transfer.The analysis had been carried out on a five storey RCC frame structure which has been analyzed. Analysis was carried out considering different positions of floating column by using STAAD pro. The effect of position of floating column was also studied. The bending moments were higher for all the floating column cases. The final maximum bending moments values were also influenced by the presence of floating column.

4. **Kavya N[2016],** concluded that the natural time period depends on the building configuration. Lateral displacement increases along the height of the building. There is more increase in the displacement for the floating column buildings compared with the regular building. The inter storey drift also increases as the increase in the number of storey's. The storey drift is more for the floating column buildings because as the columns are removed the mass gets increased hence the drift. As the mass and

stiffness increases the base shear also increases. Therefore, the base shear is more for the floating column buildings compared to the conventional buildings. Hence, from the study it was concluded that as far as possible, the floating columns are to be avoided especially, in the seismic prone areas.

3. OBJECTIVES OF STUDY

1. Analysis of a high rise storey building with and without use of floating column.
2. Design of building with floating column using SAP 2000 V20.0.0
3. Finding out the effect on different design parameters under seismic effects due to the presence of floating column
4. To compare the benefits of providing floating column

To compare the results of all the models as obtained.

4. METHODOLOGY

Twelve Model are considered among which 6 are being analyzed as rectangular building and 6 are analyzed as square buildings. Which are compared with a non floating column building

5. STRUCTURAL MODELLING

Table-1 *Design detail*

S.NO	Particulars	Dimension/value
1	Plan Area	(25 x 25m^2) & (25x24)m^2
2	Beam Size	230*450mm
3	Transfer Beam Size	750*750mm
4	Column1	750*750mm
5	Column2	500*500mm
6	Slab Thickness	125mm
7	Floor to Floor height	3 m
8	Height of building	39 m
9	Live load	3KN/m^2
10	Floor finish	1.8KN/m^2
11	Earthquake load	As per IS-1893-2016(Part –I)
12	Analysis method	Response Spectrum Analysis
13	No of stories	G +12
14	Software used	Sap 2000v20.2.0
15	Grade of concrete	M25, M30, M35
16	Grade of steel	Fe 550

Seismic Parameters Details		
Frame Type	Special Moment Resisting Frame	
Response Reduction Factor (R)		5
Seismic Zone Factor (Z)	Zone IV	0.24
Importance Factor (I)	Residential Building	1.2
Time Period	User Defined	1

Model 1 - Square Building without any floating column.
Model 2 - Square building with floating column at ground floor.
Model 3- Square model with floating column at 1st floor.
Model 4- Square model with floating column at 2nd floor.
Model 5- Square model with floating column at 3rd floor.
Model 6-Square model with floating column at 4th floor.
Model 7 – Rectangular building without any floating column.
Model 8-Rectangular building with floating column at ground floor.
Model 9-Rectangular building with floating column at 1st floor.
Model 10-Rectangular building with floating column at 2nd floor.
Model 11-Rectangular building with floating column at 3rd floor.
Model 12-Rectangular building with floating column at 4th floor.

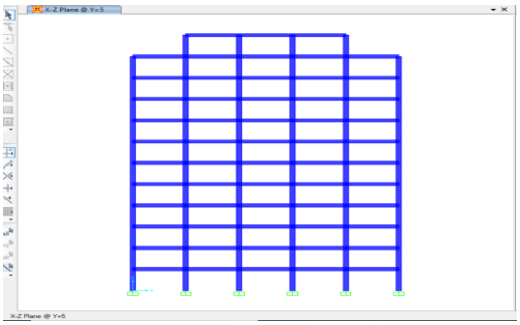


Fig1:-without floating column model-1

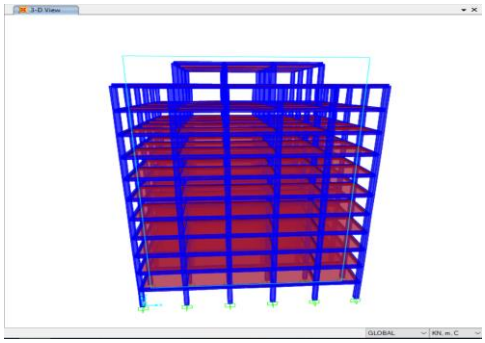


Fig2:-3D view of model -1

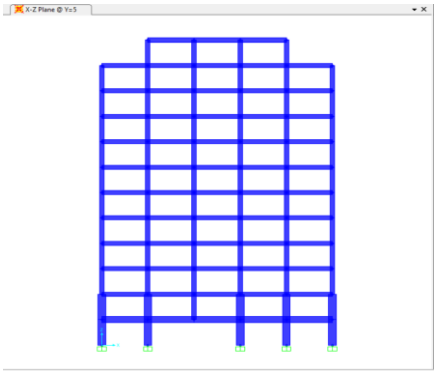


Fig3:- floating column model at ground floor

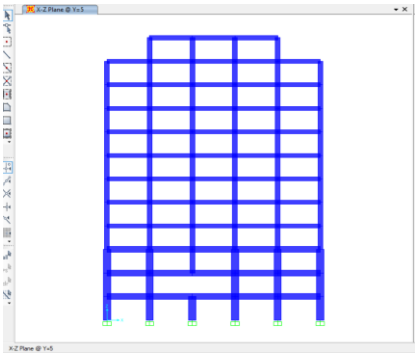


Fig 4:-Floating column at 1st floor

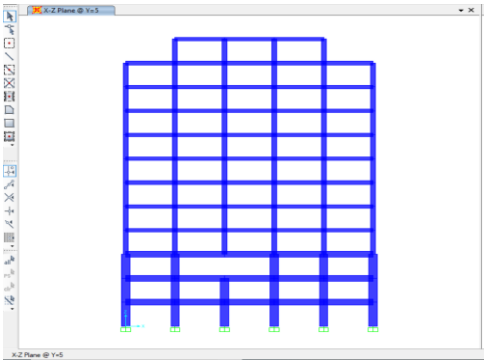


Fig5:-floating column at 2nd floor

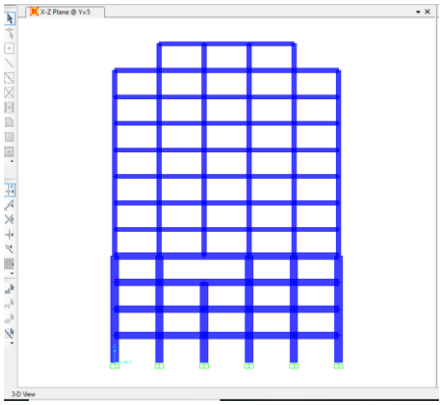


Fig6:-floating column at 3rd floor model-5

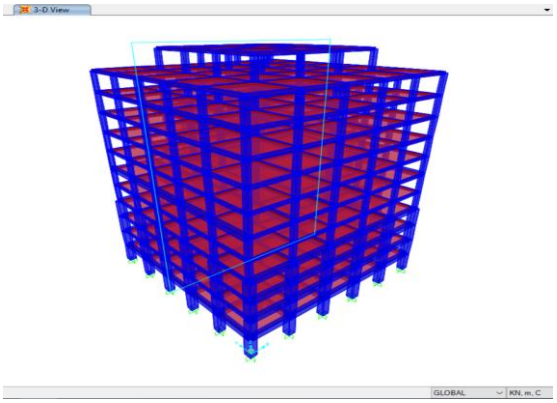


Fig7:-3D view of model-5

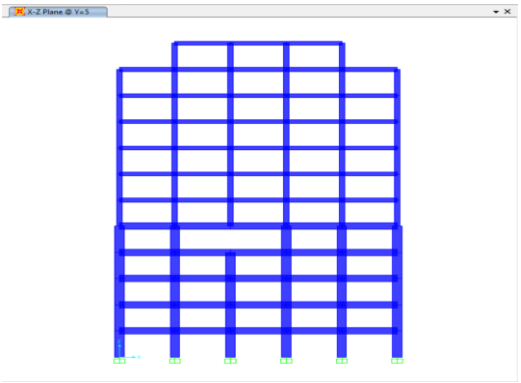


FIG8:-floating column at 4th floor.

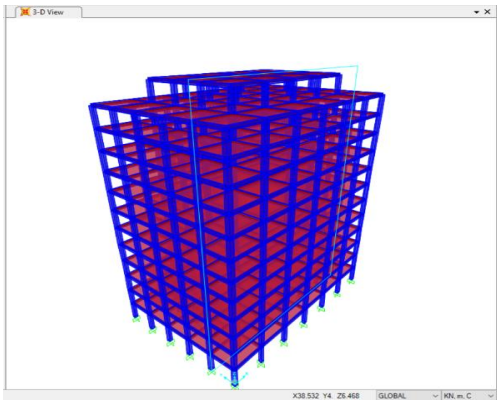


Fig9:-3D view of model -7

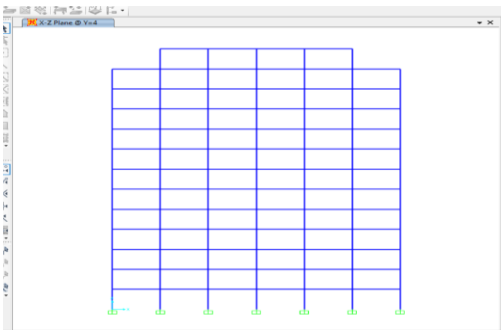


Fig10:- without floating column model

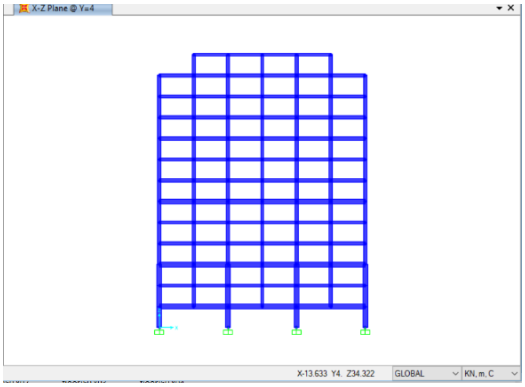


Fig11:-model-8 floating column at ground floor

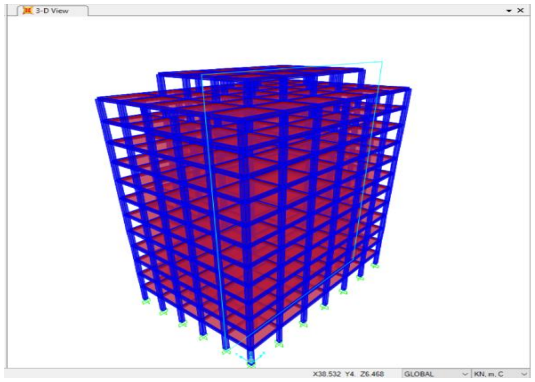


Fig12:-3D view of model -8

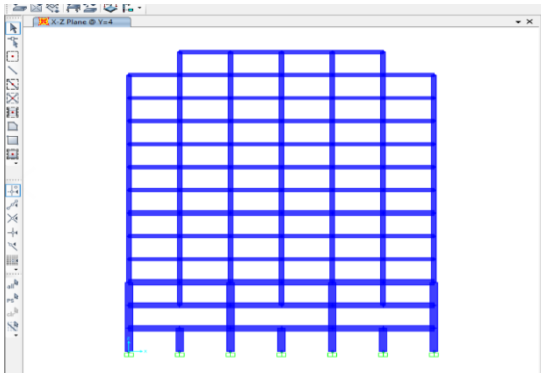


Fig13:-model-9 floating column at 1st floor

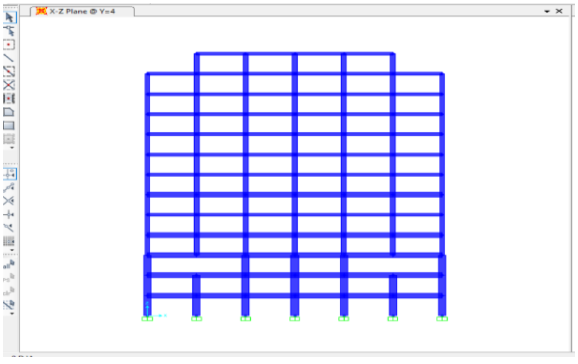


Fig14:-model-10 floating column at 2nd floor

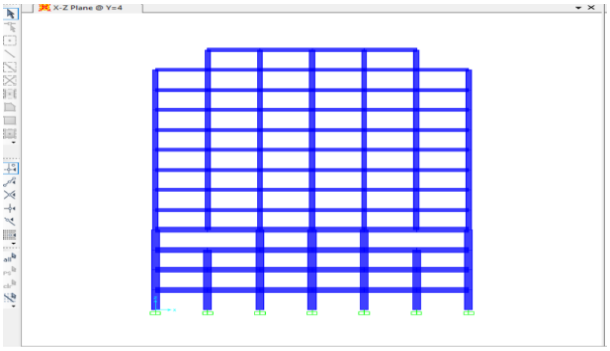


Fig 15:-model-11 foating column at 3rd floor

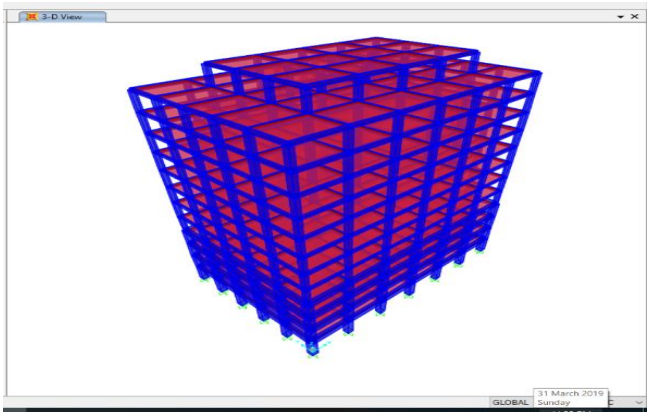


Fig16:-3D view of model-11

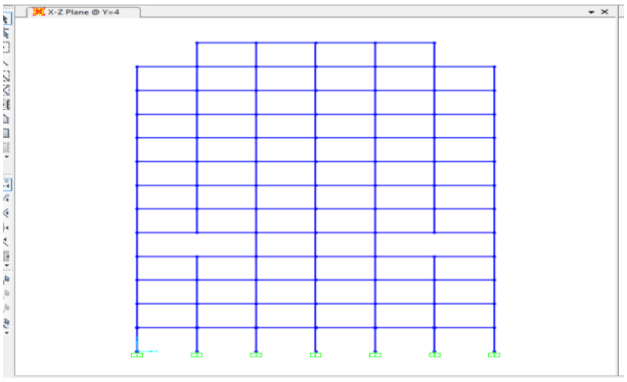


Fig17:-model -12 floating column at 4th floor

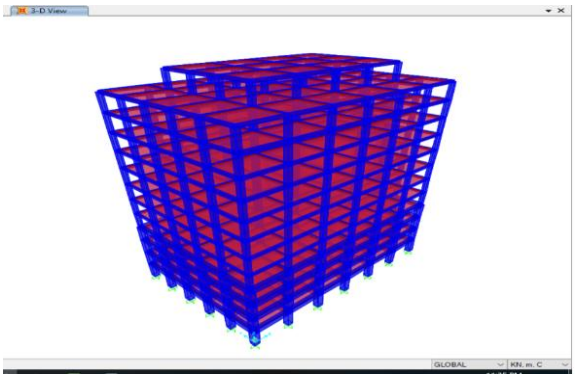
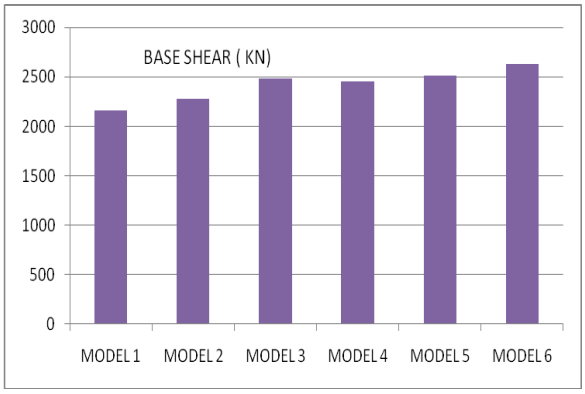
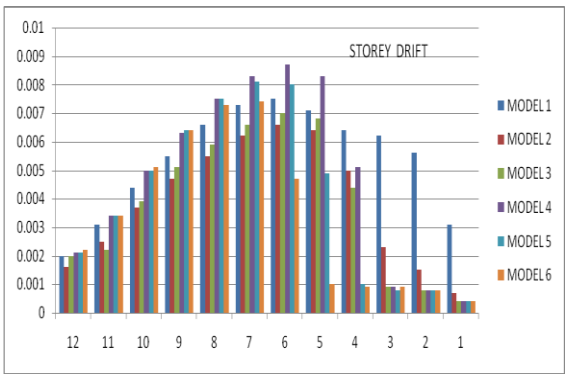
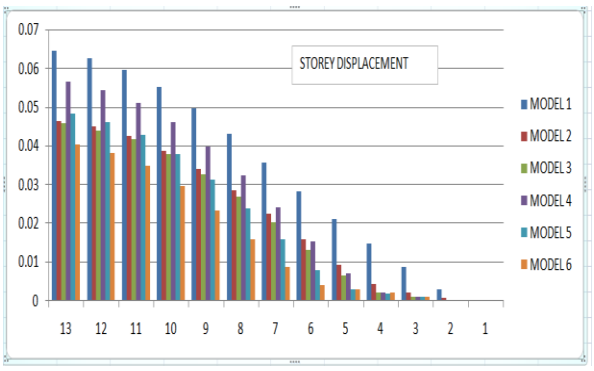


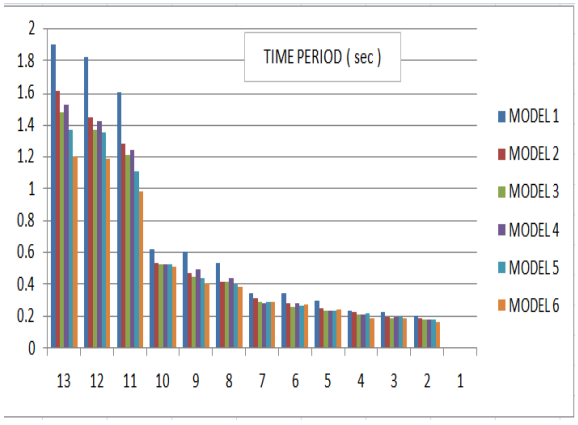
Fig18:-3-D view of model -12

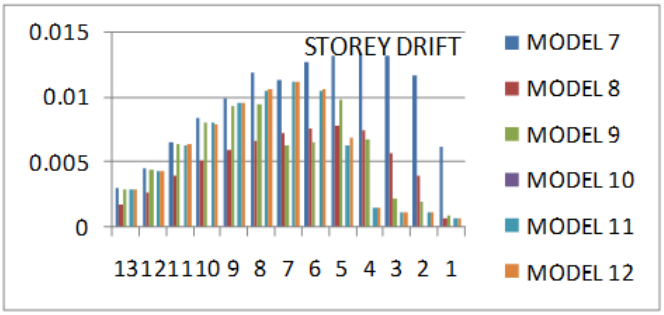
5. Results

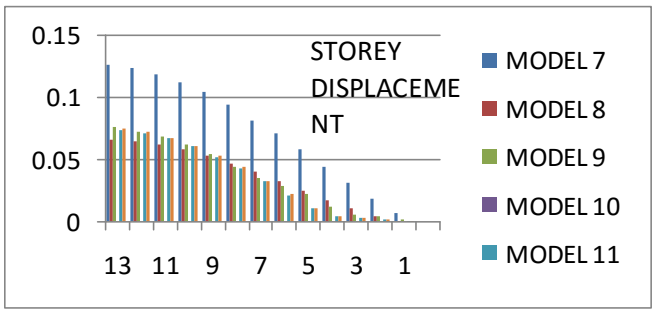


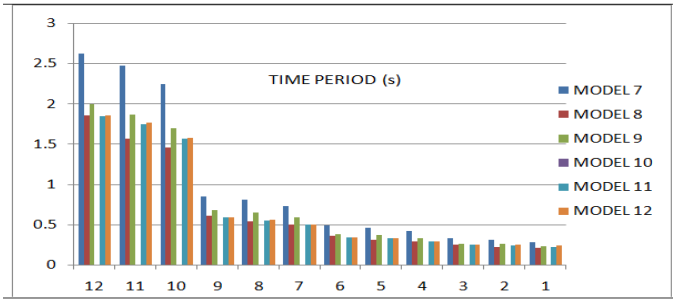


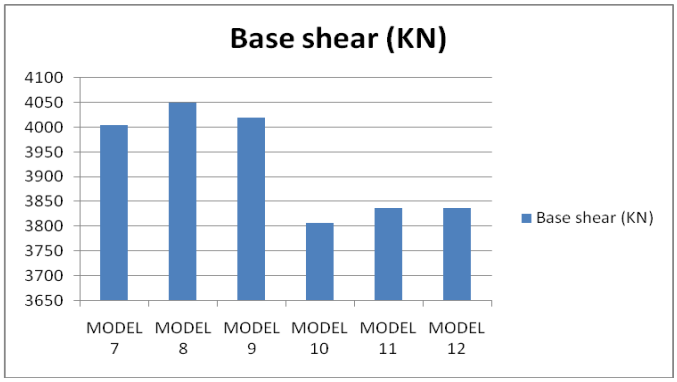












6. CONCLUSIONS

The studies of various research and analyzing the studies mentioned above, it can be concluded that the use of floating column in the modern buildings are increasing vastly. The unavoidable requirements of space at the time of its shortage can be fulfilled by floating column leading to increase in their demand within residential building as well as commercial building.

Building provided with floating column shows more storey drift and storey displacement as compared to building without floating column in seismic prone area.

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