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"STRUCTURAL ANALYSIS OF IRREGULAR REINFORCED CONCRETE BUILDING DUE TO EARTHQUAKE"

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ABSTRACT:

Construction plans with irregularities are the most useful set of building forms for urban areas, especially for residential apartments and hotels, which allow you to place large planned areas in a relatively compact form, but still provide a high percentage of rooms around the perimeter with access to air and light. The models includes Model-1: G+3 Irregular Building without earthquake, Model-2: G+3 Irregular Building with earthquake zone-II, Model-3: G+3 Irregular Building with earthquake zone-III, Model-4: G+3 Irregular Building with earthquake zone-IV, Model-5: G+3 Irregular Building with earthquake zone-V, Model-6: G+6 Irregular Building without earthquake, Model-7: G+6 Irregular Building with earthquake zone-II, Model-8: G+6 Irregular Building with earthquake zone-III, Model-9: G+6 Irregular Building with earthquake zone-IV and Model-10: G+6 Irregular Building with earthquake zone-V. The horizontal (Z) displacement is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 14.9 mm. Resultant Displacement is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 15.23 mm..

Keywords- Irregularity, Seismic, displacement and buildings

01. Introduction

As part of the analysis of irregularity, it is necessary to calculate the maximum lateral drift for each wing. The sum of these values is equal to the amount of space required between the wings so that, at worst, the different wings are deflected without knocking on each other. In these cases, the expansion joint is used to connect the wings together. Considering each wing as separate structures, the irregularity is essentially ignored [6]. Although vertical and lateral loads are taken into account for individual wings, the resulting force in unevenness is not solved, but differential movements in the corner are difficult to place without special seals and expansion joints, included in the design [7]. Another design approach currently used to eliminate forces in irregularity, - is the use of spray instead of the traditional angle of 90 T. N. When you change the degree of angle in unevenness, force arises. Sprayers "strongly connect the building along voltage concentration lines and find stable elements to reduce torsion".

02. Literature Review

Agarwal, P. and others. noted that although irregularities after a side load event have been observed for more than a hundred years, only in the last twenty years has a study been conducted, to try to better understand and determine the amount of forces in irregularity. Because it is difficult to determine analytically the magnitude of forces, as explained earlier, the models were developed and tested either in wind tunnels or on swamp tables to study forces in irregularity structures.

Ahmad J. Durrani et al. The behavior of the engineering light - of the frame structure of the wood under lateral loads was investigated. Part of the investigation was the study of aperture with irregularity. Evenly distributed load was applied to the model by using gas bags installed along the outer edges of the floor. As part of their study, a number of tests were conducted, one of which was a test for final load. After the final load test, the model inequality was investigated. It was found that no visible damage was done. They concluded that the lateral load can be successfully resisted without a continuous end chord if the aperture inequality is less than 1.0 meters.

03. Methodology

The different models are modeled using STAAD-PRO as follows.

i. Model-1: G+3 Irregular Building without earthquake
ii. Model-2: G+3 Irregular Building with earthquake zone-II
iii. Model-3: G+3 Irregular Building with earthquake zone-III
iv. Model-4: G+3 Irregular Building with earthquake zone-IV
v. Model-5: G+3 Irregular Building with earthquake zone-V

vi. Model-6: G+6 Irregular Building without earthquake
vii. Model-7: G+6 Irregular Building with earthquake zone-II
viii. Model-8: G+6 Irregular Building with earthquake zone-III
ix. Model-9: G+6 Irregular Building with earthquake zone-IV
x. Model-10: G+6 Irregular Building with earthquake zone-V

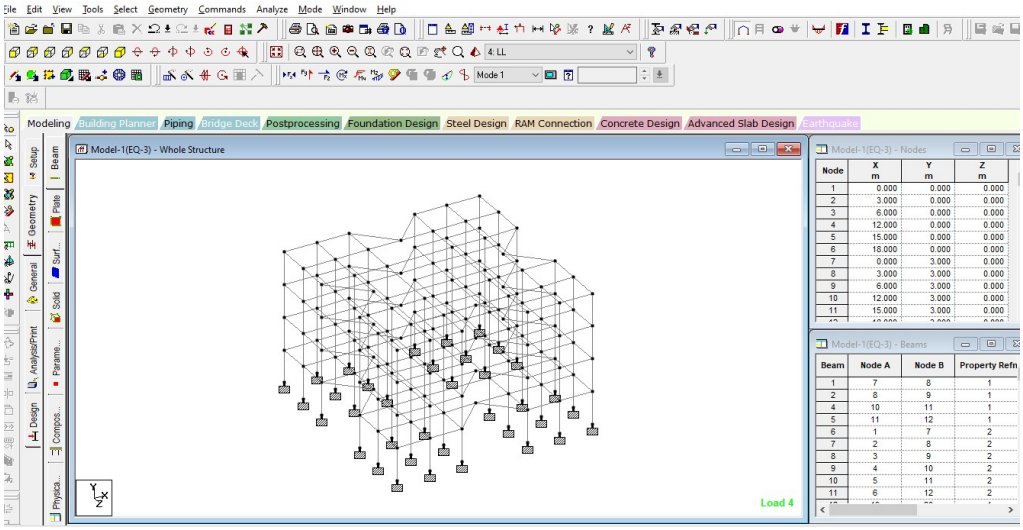

Figure 1:Geometry of the model

The above figure gives the details about the geometry of the models as obtained in the STAAD-PRO software.

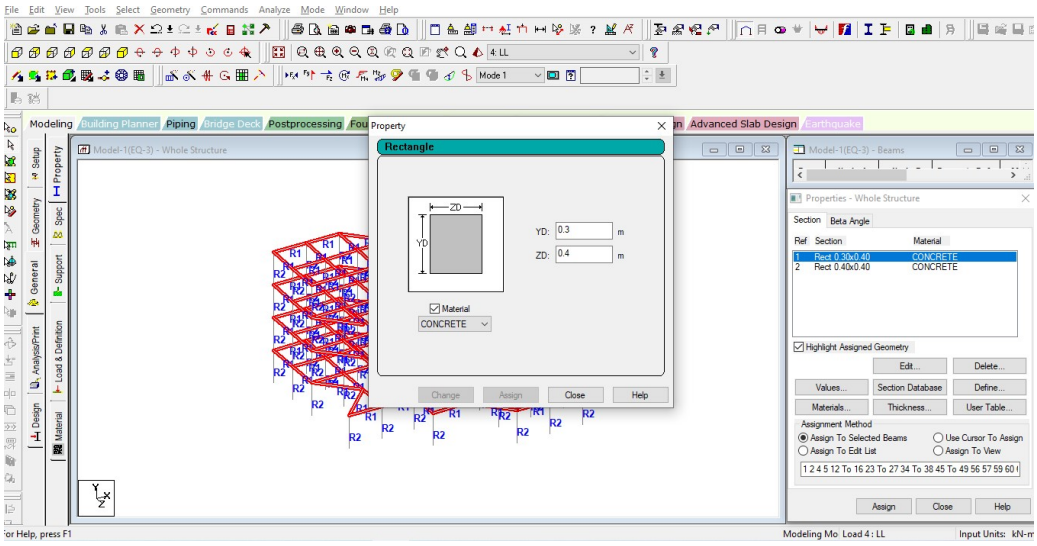

Figure 2:Beam Properties of the model

The above figure gives the details about the Beam Properties of the models as obtained in the STAAD-PRO software.

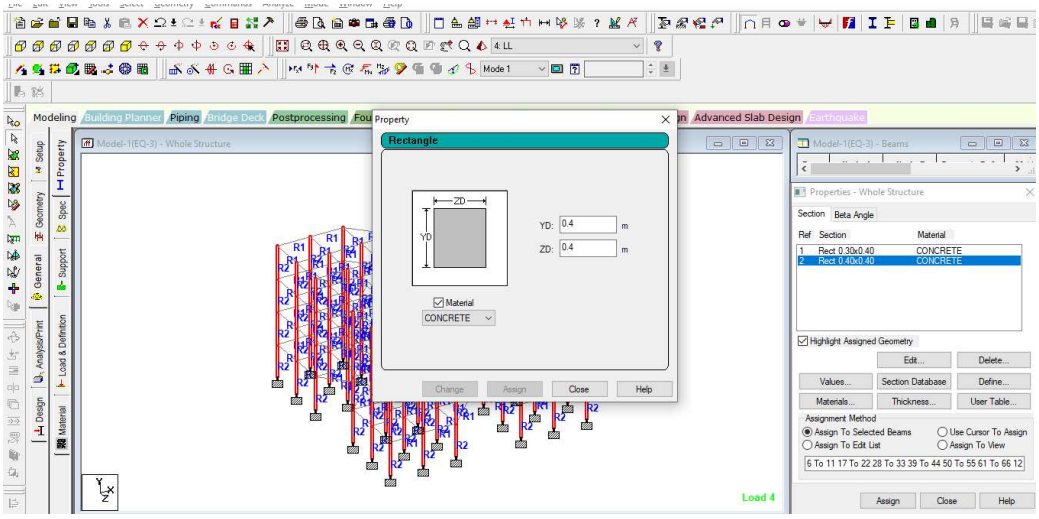

Figure 3:Column Properties of the model

The above figure gives the details about the Column Properties of the models as obtained in the STAAD-PRO software.

04. Results & Discussions

Table 1:Displacement for all the models

	Horizontal X mm	Vertical Y mm	Horizontal Z mm	Resultant mm
Model-1	0.196	4.326	0.196	4.33
Model-2	1.773	4.326	1.773	4.33
Model-3	2.78	4.326	2.78	4.33
Model-4	4.123	4.326	4.123	4.885
Model-5	6.137	4.326	6.137	6.53
Model-6	0.271	5.885	0.271	5.892
Model-7	4.231	5.885	4.231	5.892
Model-8	6.696	5.885	6.696	7.318
Model-9	9.982	5.885	9.982	10.417
Model-10	14.911	5.885	14.911	15.213

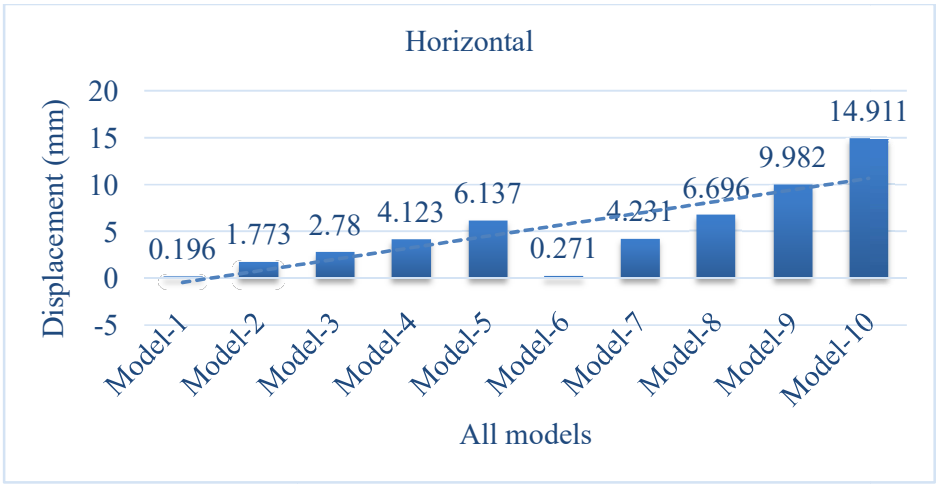

Figure 4:Horizontal (X) Displacement for all the models

From the above it is observed that the horizontal (X) displacement is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 14.9 mm.

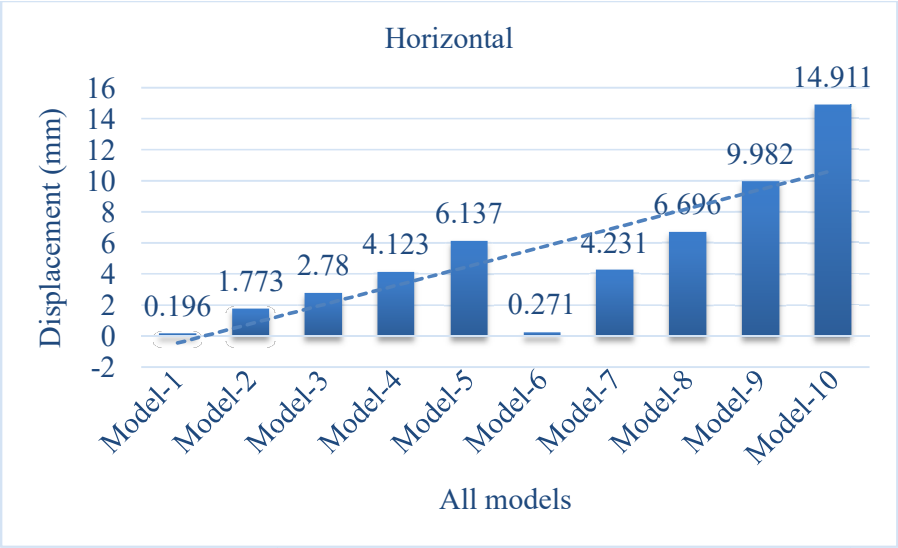

Figure 5:Horizontal (Z) Displacement for all the models

From the above it is observed that the horizontal (Z) displacement is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 14.9 mm.

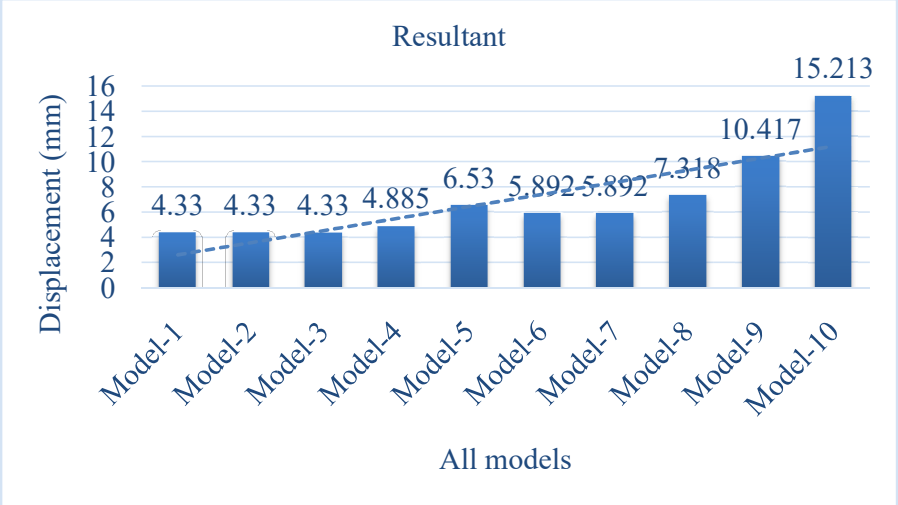

Figure 6:Resultant Displacement for all the models

From the above it is observed that :Resultant Displacement is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 15.23 mm.

Table 2:Reactions for all the models

	Horizontal	Vertical	Horizontal	Moment		
	FxkN	FykN	FzkN	MxkNm	My kNm	MzkNm
Model-1	8.259	599.014	8.259	8.175	0.293	8.175
Model-2	8.925	599.014	8.925	11.514	0.293	11.514
Model-3	10.316	599.014	10.316	14.499	0.293	14.499
Model-4	12.171	599.014	12.171	18.478	0.293	18.478

Model-5	14.953	599.014	14.953	24.79	0.293	24.79
Model-6	8.457	1008.62	8.457	8.381	0.342	8.381
Model-7	9.752	1008.62	9.752	13.188	0.342	13.188
Model-8	11.544	1008.62	11.544	17.077	0.342	17.077
Model-9	13.933	1008.62	13.933	22.263	0.342	22.263
Model-10	17.517	1008.62	17.517	31.812	0.342	31.812

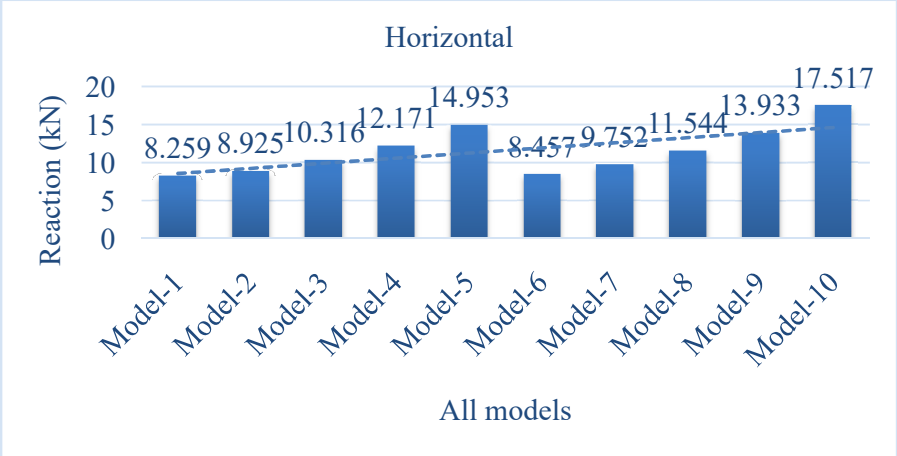

Figure 7:Horizontal Reaction (Fx) for all the models

From the above it is observed that Horizontal Reaction (Fx) is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 17.57 kN.

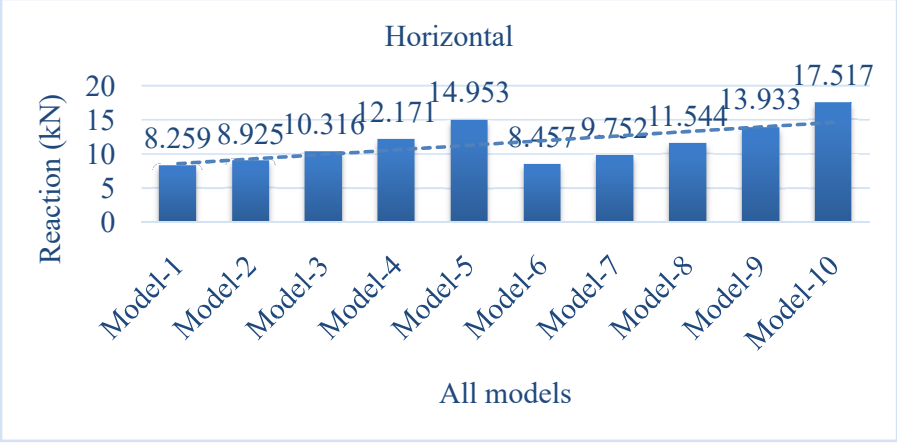

Figure 8:Horizontal Reaction (Fz) for all the models

From the above it is observed that Horizontal Reaction (Fx) is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 17.57 kN.

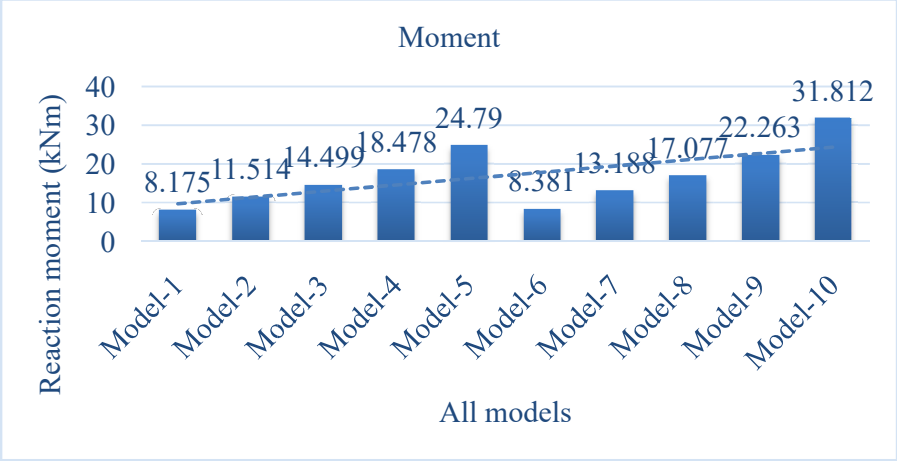

Figure 9:Moment (Mx) for all the models

From the above it is observed that Moment (Mx) is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 31.82 kNm.

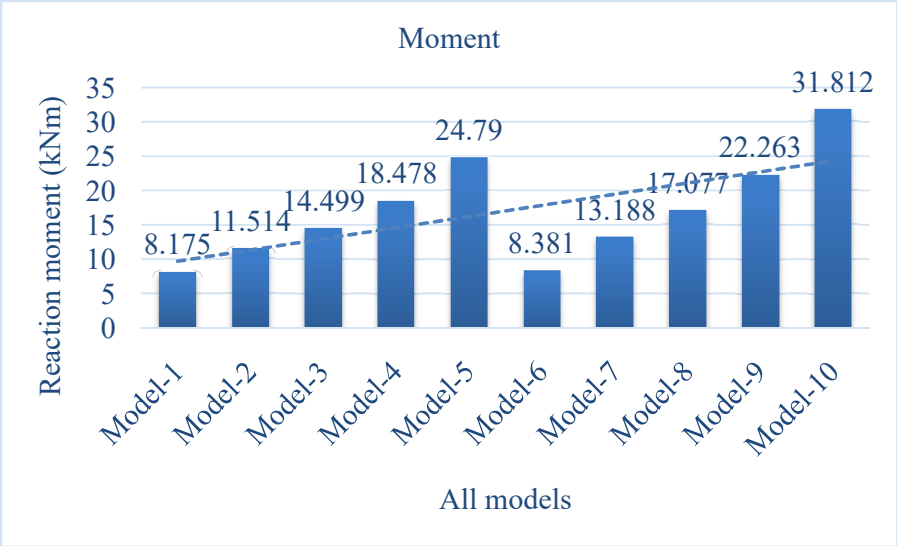

Figure 10:Moment (Mz) for all the models

From the above it is observed that Moment (Mz) is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 31.82 kNm.

05. Conclusions

The following conclusions are drawn based on the present study.

1. The horizontal (X) displacement is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 14.9 mm.
2. The horizontal (Z) displacement is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 14.9 mm.
3. Resultant Displacement is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 15.23 mm.
4. Horizontal Reaction (Fx) is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 17.57 kN.
5. Moment (Mx) is maximum in the model-10 (G+6 Irregular Building with earthquake zone-V) with value of 31.82 kNm.

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