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Structural Analysis of High Rise Building with Core and Outrigger System: A Review

Mr. Abdul Danish[1] and Prof. Ishan Dahat[2]
PG Scholar, Department of Civil Engineering[1]
Assistant Professor, Department of Civil Engineering[2]
G H Raisoni University, Amravati, Maharashtra, India

Abstract: *In India, the tall building has always been a vision of dreams and technical progress, leading to the progress of the world. Currently, with rapidly growing urbanization, the tall building has become a more convenient option for office and residential housing. Tall buildings are usually designed for residential, office or commercial use. They are primarily a reaction to the rapid growth of the urban population and the demand for business as close to each other as possible. Much of India is prone to damage to seismic hazards. Therefore, it is necessary to take into account the seismic load to design the design of the height design. The high-rise building - uses different resistance systems because the side loads caused by the earthquake are a cause for concern.*

Keywords: Tall buildings, seismic, displacement, outrigger and shear wall

I. INTRODUCTION

A tall building like a skipping rope has always been a vision of dreams and technical progress with new types of equipment leading to the progress of construction in the world. To date, the Tall building has become a more convenient option for residential and commercial housing due to the rapid growth of urbanization. Tall buildings are designed for residential and office use. This is the main reaction to the rapid growth of the urban population and the demand for business. Much of our country is prone to damage to seismic hazards due to earthquakes. Therefore, it is necessary to take into account the seismic load for the design of a high - lifting structure. Various side load resistance systems are used in high - lifting buildings . These lateral forces can create critical stresses in the structural and non-structural element in construction, causing unwanted stresses in the structure, and unwanted oscillations or cause excessive lateral oscillations of the structure.

II. LITERATURE REVIEW

2.1 Related Work

A S Jagadheeswari et al [1] studied analysis of the response spectrum gives lower results compared to static analysis, the decrease in values is about 24. This explains that ESA gives higher results and safety, which will be sufficient in the analysis of buildings of low rise and less important. Floor drift values will always be consistent with displacement values. Higher drift values are observed in the 1 model and lower in the case of the 3 model. It may notice several dives in the graph, indicating the presence of a rigid element, an autrigger system. The time period of the model 1 is high due to flexibility in the structure. However, the 3 model behaves more rigidly, so the time period is shorter. These buildings demonstrate rigidity and resilience, as well as better seismic analysis performance. The values of the base offset are almost the same in all models. The basic shift depends on the mass, height and dynamics of the building. However, it can be seen that the building has almost the same mass and height, there is no noticeable difference in the models. Therefore, it can be concluded that the provision of the autrigger system will not change in the base cost of the shift, as it depends purely on the mass, height and dynamics of the building.

Abbas Haghollahi et al [2] studied the development of a tall building that is growing rapidly around the world. In typical structural design practice, the main focus is on the lateral - load - of the opposing systems. Structural autrigger systems are one of the systems that withstand lateral loading, which can provide significant drift control for tall buildings. The study is conducted on a 30 - floor high-rise wall building 30 -. For analysis, the usual floor plan of 38.5 m x 38.5 m is considered. There are two types of analysis, namely time history analysis and analysis. To obtain the results, the –

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maximum floor offset is taken into account. In this paper, the results of the various design systems in the composition were analyzed using ETABS software.

Abdul Karim Mulla et al. [3 investigated the behavior of the outrigger with and without a system of belt farms, studied in both symmetrical and asymmetric structure. It has been studied that an outrigger with a system of belt farms is effective in controlling the drift of a building. Even in the asymmetric structure, drift is controlled to the maximum. Thus, autrigger systems with belt farms improve the performance of the building by resisting the side forces.

Alpana L. Gawate et al. [4] investigated that there was a slight change in the construction period and the base shift of the building. The autrigger system as sliding walls on the periphery of the building on 8-m, 16-m and 24-m floors reduces movement by 4.5%. There is also a reduction in the construction period by 5%, and the base shift - by 8%. The optimal type of exposure is model V, ie. Building with outer X-brac on 8-m, 16-m and 24-m floors)

Alpana L. Gawate et al [5] investigated the use of the autrigger system in high-rise - lifting buildings increases rigidity and makes the structural shape effective at lateral loading. X Weaving and sliding walls as certain shelter floors can be used as transportation systems. The autrigger system as X- lift on the periphery of the building on 12-m and 24-m floors reduces the volume of the upper floor by 4.5%. There is a slight change in the construction period and the basic shift of the building. The autrigger system as sliding walls on the periphery of the building on 12-m and 24-m floors reduces movement by 3.5%.

S. D. Hoenderkamp [6] studied five three-dimensional models 60 − are subjected to earthquake load, analyzed and compared to detect a decrease in lateral displacement associated with the location of the outrigger and belt system. For the two-dimensional model 40 − 65%, the maximum reduction in movement can be achieved by providing the first screwdriver in the upper and second landings in the middle of the height of the structure. For the three-dimensional 60 − floor structural model that has been subjected to earthquake load, about 18% reduction in maximum displacement can be achieved by optimally locating OTC farms located at the top and 33- level.

III. CONCLUSION

From previous research papers, various researchers have so far conducted research on the geometrically regular form of construction, including the structural system of the outrigger. However, the alpine building does not have scientific work related to the implementation of the structural system, especially with a geometrically irregular and asymmetrical shape in the plan. Various researchers have conducted research to consider static and dynamic behavior within elasticity. Currently, using modern software, we can also analyze buildings by nonlinear methods, such as time history analysis. Researchers also conducted a study of the behavior of the structural system, considering simple grids instead of a real construction plan.

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