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Review Paper on Effect of Wind on Building Resting on Sloping Ground and Analysis Using Etabs

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Abstract: ***Wind has paramount importance in the field of civil engineering. Due to urbanization and increasing population density high rise building are coming up in large number. Therefore building frame resting on sloping ground and its analysis and design becomes essential so that the structure becomes more durable and serviceable. It is possible by various special programs and software. Software helps to design light weighted structure with good service life.***
This project studies the effect of wind velocity and structural response of building frame on sloping ground. For that three different building heights (G+8, G+10 and G+12) are considered. Ground slope (0°, 5°, 10° and 15°) and wind zones (33, 39, 44, 47 and 55 m/s)has been considered. Comparative study of various parameters such as shear force, bending moment drift with the help of ETABS software gives appropriate result.
Keyword: sloping ground, shear force, bending moment, wind zone, ETABS

I. INTRODUCTION

Wind is moving air caused by differences in air pressure within our atmosphere. The term wind load is used to refer any pressure or force that wind exerts on the structure. It is climate related changing effect on structure and is results from pressure distribution around structure that is supposed to wind flow. Wind exerts static and dynamic load on the building. Static load creates elastic bending and twisting of building while complicated dynamic wind load affects the structural design of the structure creates fluctuating forces all over the building.

In past few decades urbanization is increased because of modernization, industrialization and social rationalization. More than half of the world population lives in urban areas. In modern days urbanization is considered as a sign of economic progress but at the same time urban areas becoming more populated and dense. On the other hand land scarce and ever growing demand of accommodation also increasing.

Therefore Owing to scarce land resources, urbanization and ever-growing demand of accommodation is leading developers into sloping grounds.

In this modern days wind disasters, urbanization, population density, sloping ground utilization are increasing day by day. Construction on sloping ground should have to overcome this wind effect and give more efficient and serviceable structure. this project aims to study the building frame resting on sloping ground effectively. The effect of slope and wind on building frame will study and analyse using ETABS software so that structure withstand excess loads during the building's life cycle despite expected wind deflections.

II. ETABS SOFTWARE

Etabs stands for extended three dimensional analysis of building structure. It is an engineering software product that caters to multi-storey building analysis and design. Modeling tools and templates code based load prescriptions, analysis methods and solution techniques all coordinate with grid like geometry unique to the class of structure.

For sophisticated performance, modal and direction integration time history analysis may couple with p delta and large displacement effect. Output and display formats are practical and intuitive. Etabs also features interoperability with related software products providing for import of architectural models from various technical drawing providing for import of architectural models for various technical drawing software.

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III. LITERATURE SURVEY

There are several studies have been made to investigate the structural performance of building frame resting on sloping ground. The effect in terms of axial force, shear force, moment support reaction, and displacement are studied for more realistic analysis quantify the effects of various slope of ground

Ravindra Navale investigated in analysis of Unsymmetrical Building Resting on Sloping Ground by Dividing In 2D Frame that When a building is rested on sloped ground, there are many possibilities of having short and long columns in same structure. During earthquake shaking, all columns move horizontally by the same amount along with the floor slab at every different level which may effects damage to the structure. The analysis where carried along both x and y direction. For the comparison of results, various graphs were drawn for bending moment bending moment developed for the frames on plane ground and sloping ground. it has been observed that bending moment in sloping terrain building is reduces considerable, but tremendously increase at base of building. The bending moment in column is increase at base of frame due to the long column and short column effect.

Abhay Galleria says in Structural Analysis of a Multi-Storeyed Building using ETABS for different Plan Configurations says that the case study in this paper mainly emphasizes on structural behavior of multi-storey building for different plan configurations like rectangular, C, L and I-shape. Modeling of 15-storeys R.C.C. framed building is done on the ETABS software for analysis. Post analysis of the structure, maximum shear forces, bending moments, and maximum storey displacement are computed and then compared for all the analyzed cases. the analysis of the multi-storeyed building reflected the storey overturning moment varies inversely with storey height. Moreover, L-shape, I-shape type buildings give almost similar response against the overturning moment.

Umakant Arya, Aslam Hussain, Waseem Khan in investigation of wind Analysis of Building Frames on Sloping Ground considered combination of static and wind loads. For combination, 60 cases in different wind zones and three different heights of building frames are analysed. STAAD-Pro software has been used for analysis purpose. After analysis, results are collected in terms of axial force, Shear force, moment, support reaction, Storey-wise drift and Displacement which are critically analysed to quantify the effects of various slope of ground. Comparative study of results as wind forces, Maximum bending moments, Maximum Axial force, Max displacements, story wise displacement, Maximum shear force , drift and reaction using STAAD PRO .

Mohit Sharma and Dr. Savita Maru say in Dynamic Analysis of Multistoried Regular Building Analysis and design of buildings for static force that there is not much difference in values of axial force, values of torsion is negative for static analysis and positive for dynamic analysis values for moment and displacement are same for static analysis and different for dynamic analysis.

Roy O. Ononye, Kevin C. Okolie F, O. Ezeokoli S..C. Ugochuikwu says in wind analysis of high rise building resting on sloping grounds of federal capital territory Abuja Nigeria that the study draws to mind the requirement of fast growing city considering its vast undulating plains and plateu. Here therein lies a comparative study of different types of building configuration and resposes for sloping ground using approaches from seismic analysis and wind analysis. Here configuration of building frames was not adversely affected by wind load for frames of six and eight floor on 60 slope. However as ground slope increases viz-a-viz number of floors, the stepback-setback configuration is proved against wind load.

IV. PROBLEM STATEMENT

In past, researchers have studied effect of wind on 2D building frame using staad pro, structural analysis of a multi-storeyed building using etabs for different plan configurations, seismic and wind analysis of a multi storey building (g+12) by using etabs software, seismic and wind analysis of ellipse building using etabs, seismic and wind analysis of asymmetrical 2D building but 3D building frame on sloping ground is not analysed. In this project I extended wind analysis to 3D building frame resting on sloping ground using etabs software.

V. OBJECTIVE

A. To study the effect of wind on building frame resting on sloping ground.
B. To study the effect of wind velocity on building with zero degree slope and different inclined slope.
C. Comparative study of effect of wind on building rests on plane and slopping ground.
D. To study the approach in field of structural engineering.
E.

VI. CONCLUSION

Analysis and design of 3D building frame for wind load is very essential these days because construction of high rise buildings. It is also necessary to construct a economic and more durable structure. It is possible by availability of various software and specialized programs. we can design a low weight reinforce structure by using these software which life is very good.

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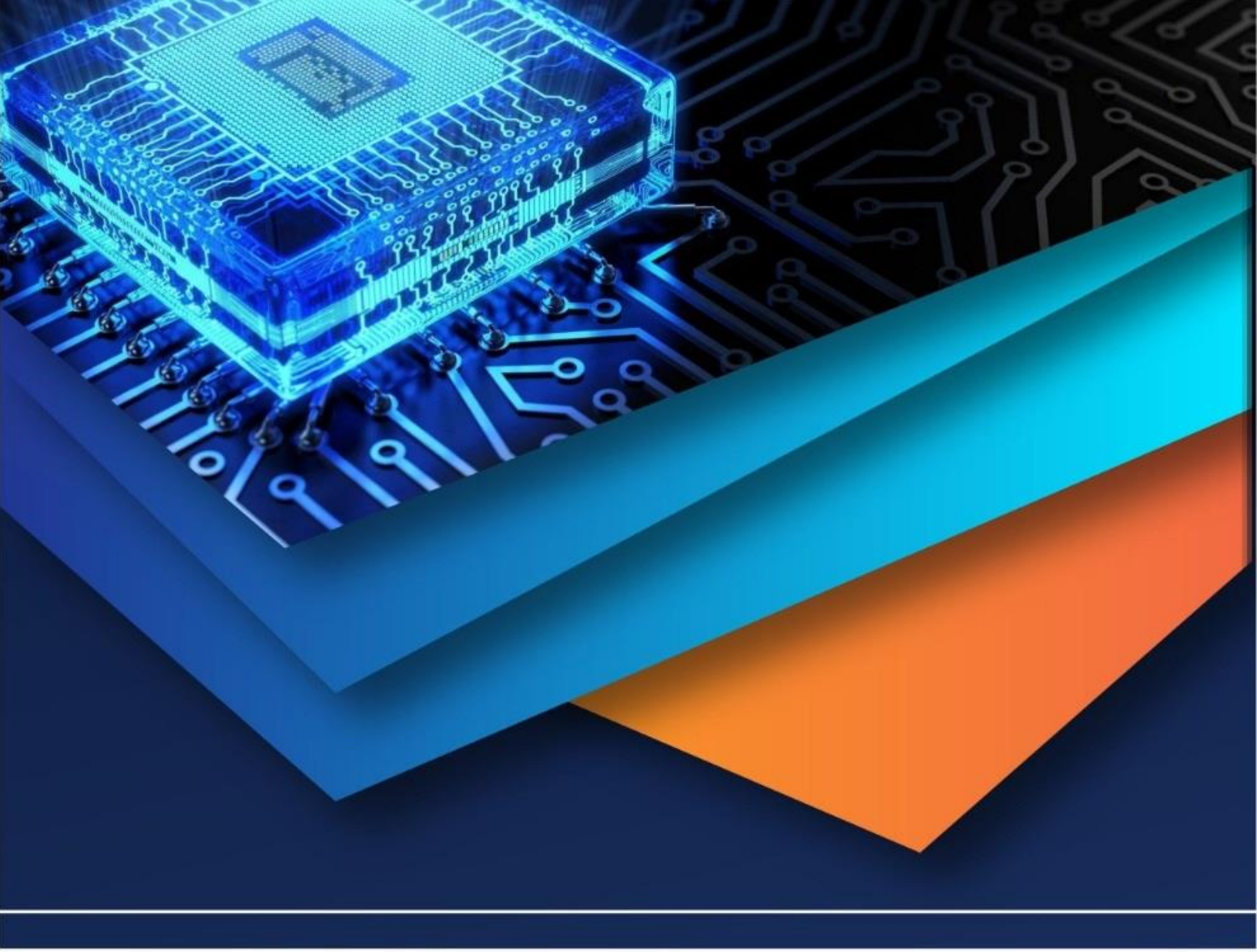
These structure more economical and safe by different forces acting on the building structure such as seismic load, snow load and wind pressure etc. Reinforced concrete frame buildings are most common type of constructions resting on plane and sloping ground in India. There buildings are subjected to several types of forces during their lifetime, such as static forces due to dead and live loads and dynamic forces due to the wind and earthquake.

Wind analyses performed on three different heights of buildings with three different ground slopes and result has been carried out by using static method. The storey drift, shear and moment action induced in columns and beams have been studied to investigate influence of sloping ground on structural performance of building frame.

REFERENCES

[1] Umakant Arya, Aslam Hussain, Waseem Khan (May 2014) "Wind Analysis of Building Frames on Sloping Ground", International Journal of Scientific and Research Publications, Volume 4,ISSN 2250-3153
[2] Abhay Guleria (May – 2014) "Structural Analysis of a Multi-Storeyed Building using ETABS for different Plan Configurations"; International Journal of Engineering Research & Technology (IJERT), Vol 3 ISSN: 2278-0181
[3] Mohit Sharma, Dr. Savita Maru (2014) "Dynamic Analysis of Multistoried Regular Building Analysis and design of buildings for static force", International journal of research in engineering and technology,vol4,issue 4.
[4] Ravindra Navale, Dr. Sandeep Hake, Pramod Kharmale (July -2017) " Analysis of Unsymmetrical Building Resting on Sloping Ground by Dividing In 2D Frame.", International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056,Volume: 04 Issue: 07 | www.irjet.net p-ISSN: 2395-0072
[5] Abhishek Kumar, Pratiksha Malviya (October 2018) "A Review Of Paper On Sloping Ground Building Structure Under Seismic And Wind Load Condition", International Journal of Trend in Scientific Research and Development (IJTSRD) ISSN: 2456-6470
[6] C.V.Siva Rama Prasad, Bhavani.K, Linga Raju.J, Prashanth.M (March 2019) "Seismic and Wind Analysis of a Multi Storey Building (G+12) By Using ETABS Software", Journal of Emerging Technologies and Innovative Research (JETIR) www.jetir.org (ISSN-2349-5162) Volume 6.
[7] Roy O. Onoye, Kevin C Okolie, F. O. Ezekoli, S. C. Ugochukwu (29 May 2020) "Wind Analysis Of High Rise Building Resting On Sloping Ground Of Fedral Capital Territory, Abuja, Nigeria".
[8] Structural Analysis And Design Of Tall Buildings: Bungale S. Taranath
[9] IS 875(part 3) 1987
[10] IS 875(part 2) 1987

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