Effect of Wind on RC Structure Resting on Sloping Ground and Analysis Done using ETABS

Details for Structure Report and Analysis

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***Abstract*— In this paper , effect of wind on RC structures is considered which are resting on sloping grounds with different inclinations and analysis is done using ETABS. Wind loads are considered . Here 5 different wind speeds are considered along with 3 different sloping ground and analysis is done .Results are formed in terms of shear force ,moment, displacement which are mainly analysed to quantify various impacts of sloping ground.**

The project work examines the structural behavouir of building in sloping geometery .In this study a G+8 storey building is analysed on varying sloping angles with degrees 0,10,15.

Keyword—Sloping ,inclinations, RC structure

I. INTRODUCTION

Wind load is considered to be one of the important design load structures .Therefore it is important to study the behaviour of wind in buildings and this should be included in academic study. Structural are design to resist earthquake, wind load and stable the structure and the damage in the structure. In GIS (Graphical Information Systems) applications, calculation of ground slope is considered to be a traditional application. There are many methods for calculating slope. In military,scientific and civilian analysis slope is an important component. Manual slope generation, based upon contour line information and is one of the established and generally accepted method.The paper deals the analysis, design is done by using the software called as E-TABS. E-TABS is 3D structural software. E- TABS is the abbreviation of "Extended 3D Analysis of Building System. In IS 875: part 3- 1987 analytical method is given. This method is usually acceptable for regular buildings and is almost based on the geometrical properties of the building and does not depend on others.

II. MATERIAL AND GEOMETRICAL PRROPERTIES

A. Material Properties

Following are the material properties taken in modelling
Density of RCC : 25 KN/m³ Density of
Masonry : 18.5KN/m³
The typical storey height floor to floor is 3m .The sections of columns are considered 350*350 mm with section beam size of 350*350

B. Loading Conditions

1. Dead Load : self wt.of slab considering 150 mm thick
   Floor finish load = 1 KN/m³
   Infill Load : 0.10*3*1805=5.55 kN/m
2. Live loads : live load on typical floors =3 KN/m^2
3. Wind load : calculation of wind load as per IS-CODE- 875 (PART 3)1987

C. Equations

The design wind pressure can be calculated by, Pd = Kd+Ka+Kc+Pz……..

Kd = wind directionality factor Ka =Area averaging factor Kc= Combination Factor .
While Kd, Kc ,Pz can be calculated with the help of table created in excel sheets
F = Cf+Ae+P (As per IS 875 part 3:1987)

*Effective area calculations ,A1 =3*3=9m^2*
*A2=3*1.05=4.5m^2*

III. SCOPE AND OBJECTIVE

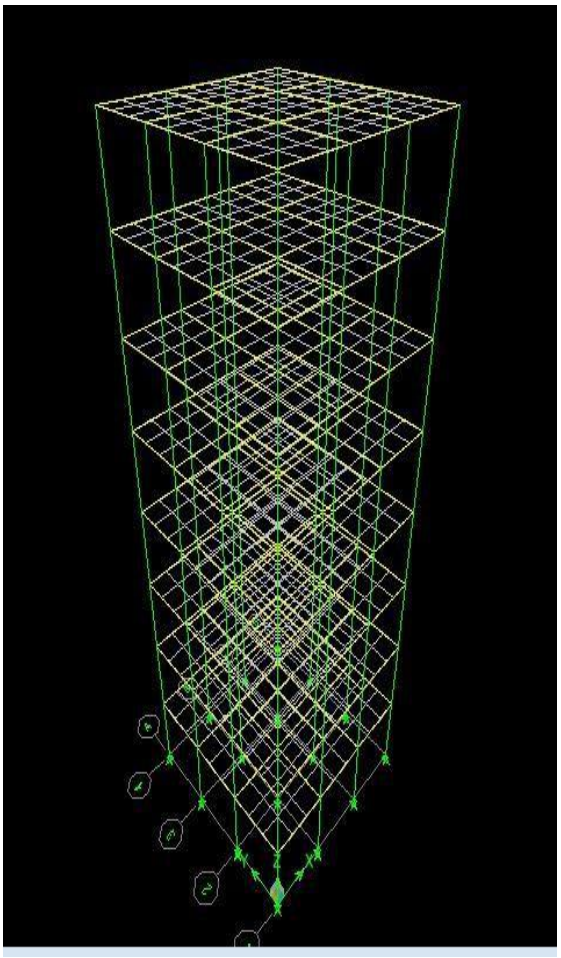
The scope of the present study is to design and analysis of G+8 building for finding the effect of wind on the structure on different sloping ground and to find the results.

IV. MODELLING

9m*9m in plan area and 8 storeys high

- TYPE A: 24 meter building height model , 0 degree inclined footing level
- TYPE B: 24 meter building height model , 5 degree inclined footing level
- TYPE C: 24 meter building height model , 10 degree inclined footing level

FIG 1 :0 Degree sloping



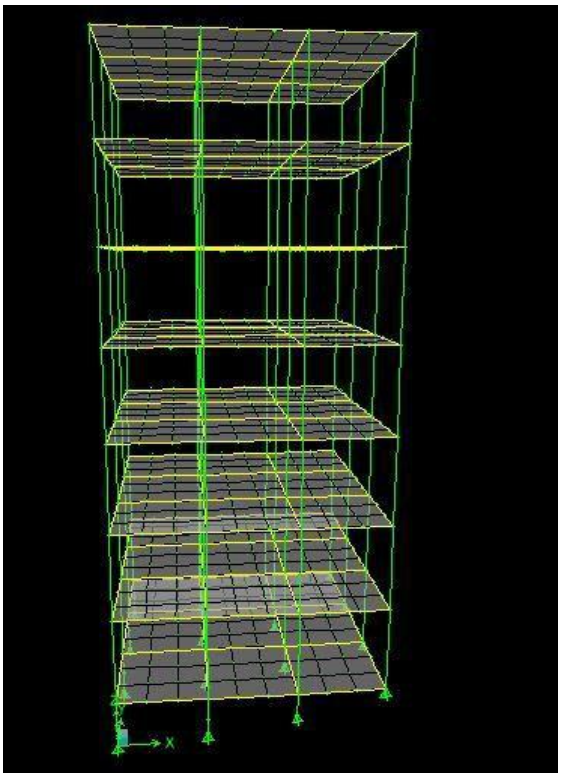
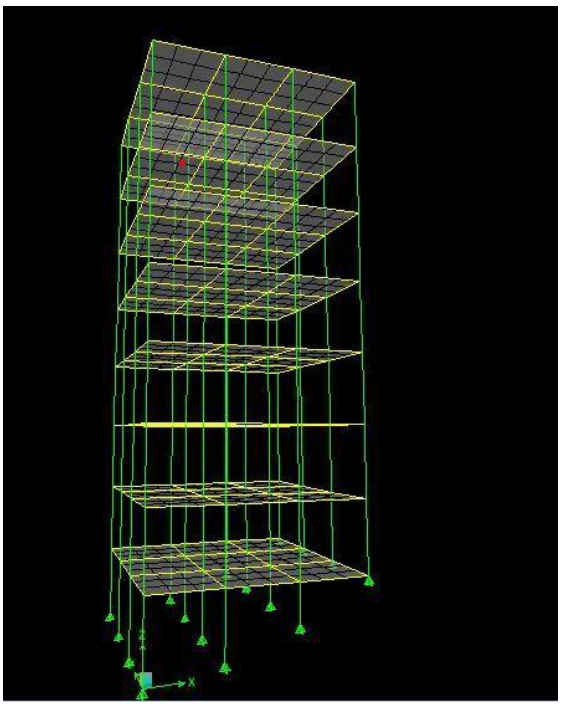


FIG 2: 5 Degree sloping

FIG 3 : 10 Degree sloping



Slope	Velocity				
	33	39	44	47	55
0	27	38.96	49.5	56	77.2
5	40.12	53.98	66.89	74.95	100
10	52.95	70.98	89	101	136.01

Table 1: max shear force in columns

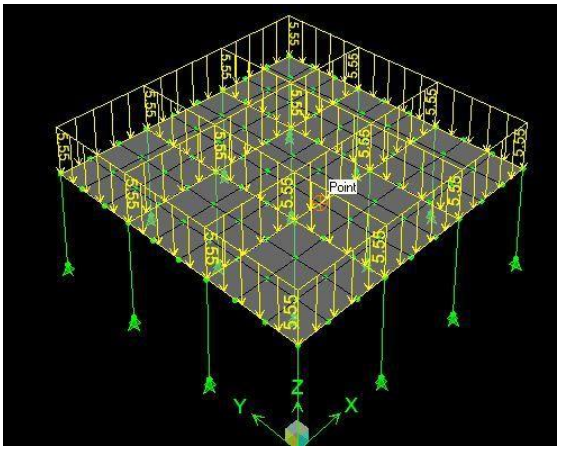
Slope	Velocity				
	33	39	44	47	55
0	40	55.65	71.01	80.98	109.96
5	41.98	56.32	71.96	82.42	112
10	51.96	73.01	91.86	104.32	144.65

Table 2: max moment in columns

Slope	Velocity				
	33	39	44	47	55
0	21.65	29.72	38	43	59.2
5	21.65	29.72	38.12	43.98	60.21
10	21.65	29.72	38.98	44.32	61.2

Table 3 : max displacment in columns

FIG 4 : Typical wall loads



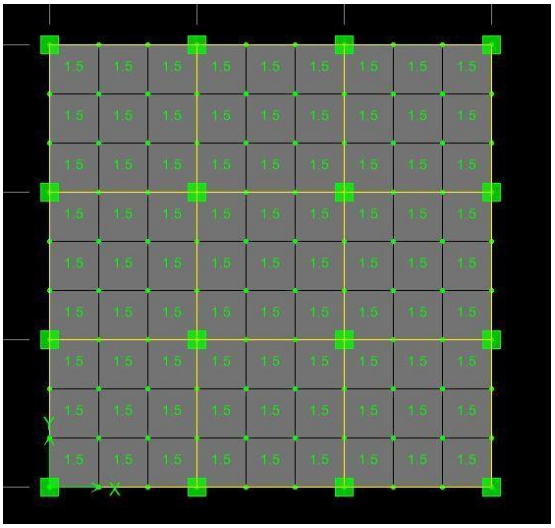
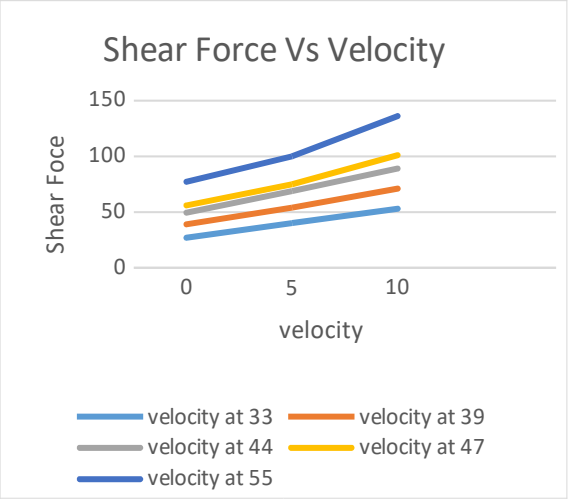
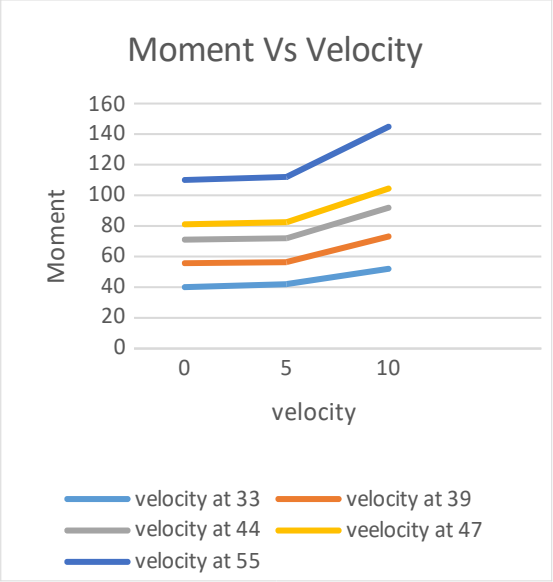


FIG 5 : Slab finishes

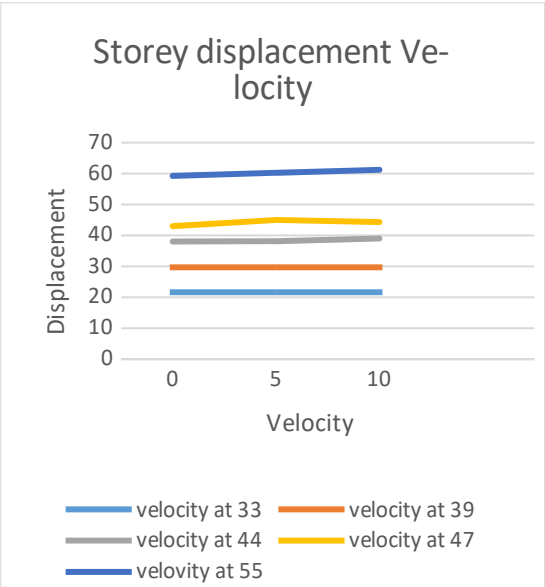
Graph 1: shear force Vs velocity



Graph 2 : Moment Vs Velocity



Graph 3 : displacement Vs velocity



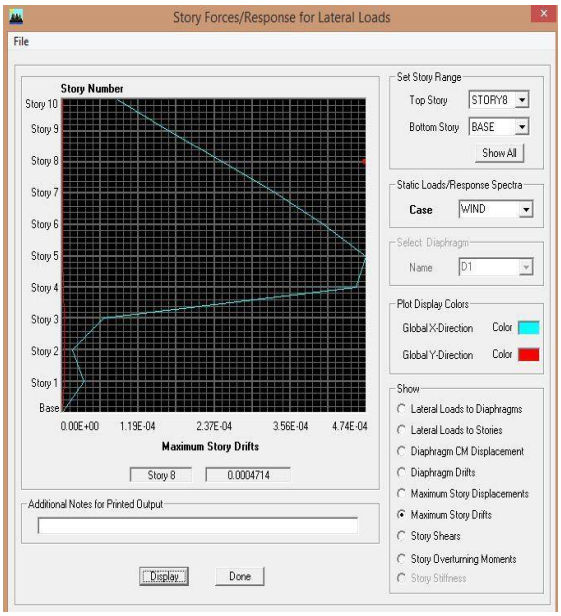


FIG 6 : 33 Wind 5D Drift

V. RESULT

- Maximum shear force in building increases with increase in wind velocity and least effect by the influence of shear force for increase the ground slope
- Maximum shear force in column increases with increase in ground slope.
- Maximum moments in beam does not get affected by increase in ground slope or sloping angle.
- Maximum moments in column increases with increase in wind velocity as well as ground slope

VI. REFERENCES

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