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Soil Interaction Effect in Multi-storied Building with Cohesive and Non Cohesive Soil

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Abstract: ***The main aim of this project is based on comparing the effect of earthquake on building structural systems having cohesive and non-cohesive soil media. The project starts with abroad note of studying for fixed base and soil interaction.***
Keywords: Seismic analysis, Earthquake excitation, Super moment resisting frame, member forces, joint displacement, support reaction, storey drift, E-tab 2016

I. INTRODUCTION

Earthquake is known to be one of the most destructive phenomenon experienced on earth. It is caused due to a sudden release of energy in the earth's crust which results in seismic waves. When the seismic waves reach the foundation level of the structure, it experiences horizontal and vertical motion at ground surface level. Due to this, earthquake is responsible for the damage to various man-made structures like buildings, bridges, roads, dams, etc. It also causes landslides, liquefaction, slope-instability and overall loss of life and property. Most of the time earthquakes are caused by the slippage along a fault in the earth's crust. When the fault ruptures in the earth's crust, the seismic waves will travel away from the source known as focus, in all direction to the ground surface. As they travel through different geological materials, the waves are reflected and refracted. Throughout the whole journey from the bedrock to the ground surface, the waves may experience amplification Soil-structure interaction (SSI) analysis evaluates the collective response of three linked systems: the structure, the foundation, and the soil underlying and surrounding the foundation. Problems associated with practical application of SSI for building structures are rooted in a poor understanding of fundamental SSI principles.

A. Advantageous of E-tab

1) Easy and quick model creation for any type of structure.
2) Creation of 3D model with utilization of plan and view.
3) Automatic consideration of self-weight of material.
4) Automatic creation of seismic load and wind load.
5) Load combination as per your defined building code is also automated.
6) Easy report and documentation

B. Loads And Load Combination

1) 1.2(DL+LL±(EQX±0.3EQY±0.3EQZ))
2) 1.2(DL+LL±(EQY±0.3EQX±0.3EQZ))
3) 1.5(DL±(EQX±0.3EQY±0.3EQZ))
4) 1.5(DL±(EQY±0.3EQX±0.3EQZ)
5) 0.9DL±1.5(EQX±0.3EQY±0.3EQZ
6) 0.9DL±1.5 (EQY±0.3EQX±0.3EQZ

Loads considered: Dead load: the load due to its self-weight.
Live load: for residential building live load is taken as KN/m2
Seismic load: the load due to acceleration response of the
Ground to the super structure

C. Model Detail

Model 1- Eleven storey(G+10) building with fixed support and cohesive soil media.
Model 2 - Eleven storey(G+10) building with soil structure interaction and cohesive soil media.
Model 3- Eleven storey(G+10) building with fixed support and non-cohesive soil media.

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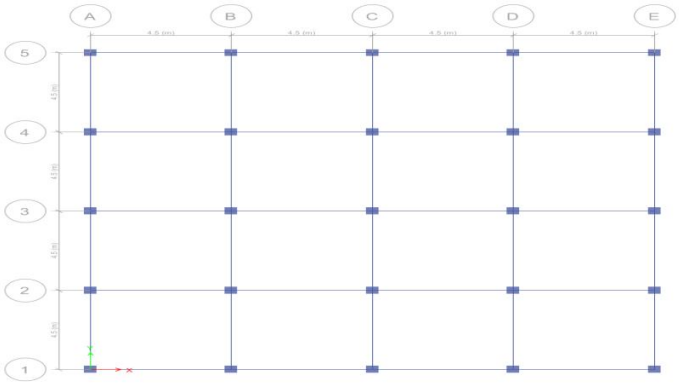


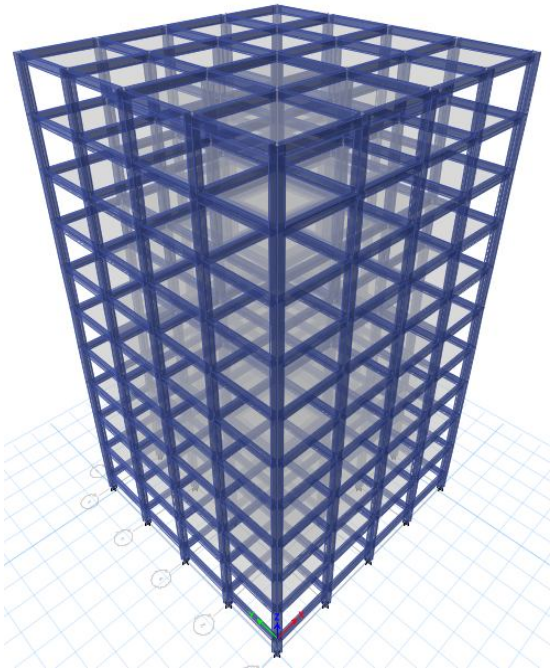
Model 4- Eleven storey(G+10) building with soil structure interaction and non-cohesive soil media

II. CALCULATION OF LOADS

According to IS code: For dead load calculations,
Unit weight of brick wall = 20 KN/m3,
Unit weight of RCC= 25 kN/m3,
Floor finish =1kN/m2 on each floor 3 and (1.5kN/m2) on roof.

A. Typical elevation of G+10 building

Fig 1- Typical floor building



III. CONCLUSION

E-tab contains anumber of parameters which are designed as per IS: 456(2000). Beams are designed for flexure, shear and torsion. Design for Flexure: Maximum sagging and hogging moments are calculated for all activeload cases at each of the above mentioned sections. Each ofthese sections are designed to resist both of these criticalsagging and hogging moments. Where ever the rectangular section is inadequate as singly reinforced section, Doubly reinforced section is tried. Design for Shear: Shear reinforcement is calculated to resistboth shear forces and torsional moments. Shear capacity calculation at different sections without the shear reinforcement is based on the actual tensile reinforcement provided by software.

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AUTHOR PROFILE

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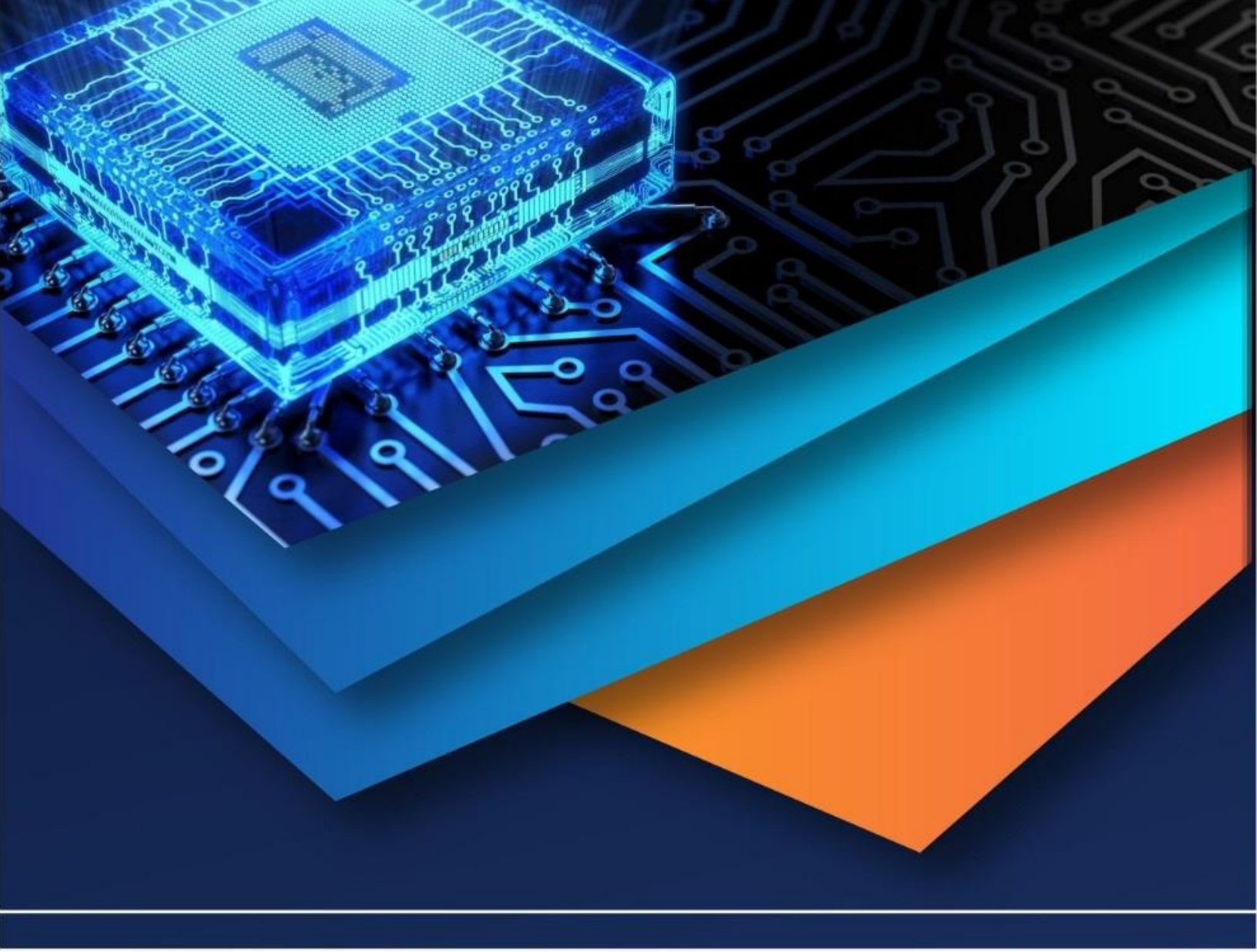

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