TIME HISTOREY ANALYSIS ON POUNDING EFFECT FOR COMPARISON OF CONVENTIONAL MODEL AND DAMPER MODEL

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Abstract – *To estimate the seismic demands, nonlinearities in the structure are to be considered when the structure enters into inelastic range during devastating earthquakes. This is due to the problems related to its complexities and suitability for practical design applications. The equi static, nonlinear procedure that can be used to estimate the dynamic needs imposed on a structure by earthquake ground motions. This project entitled "Seismic Pounding Effects in Buildings." aims at studying seismic gap between adjacent buildings by dynamic and pushover analysis in ETABS. A parametric study is conducted to investigate the minimum seismic pounding gap between two adjacent structures by response spectrum analysis for medium soil and pounding effect recorded excitation are used for input in the dynamic analysis on different models.. The effect of impact is studied using linear and nonlinear contact force on models for different separation distances and compared with nominal model without pounding consideration.*

***Key Words*:** **Conventional structure, Damper structure, Storey displacement, Storey drift, Storey stiffness, Storey shear, Pounding effect, ETABS.**

1. INTRODUCTION

The buildings in India are constructed with RCC enquires of finished and new seismic destruction proved the composition are more severe destruction ground motion. An Pounding amongst allied expanse habitation structures may be a serious risk in seismic vital regions.

The scope of this project is the have of an manual model and methods for the formulation of the adjacent building-pounding problem based on the classical impact theory. The main objective and scope are to found the consequence of structural pounding. To find the least tumorous or seismic gap amongst habitations and furnish engineers with empirical detailed instruments for auguring pounding response and destruction. A actual pounding design is used to present work under seismic zone V. Two adjoining multi-storey structures are taken as a structure for likely pounding difficulty. Time history analysis is considered to get movement attributable to earthquake. The process of the structures undergoing the loads is horizontal. As we pass to the dynamic process, we are largely anguish with the displacements, drift, shear, stiffness'. Etc of the structure under the action of tectonic loads. In structural aspect is found once the building undergoes into the elastic stage. The time history can be used for calculating the dynamic loads on a structure by ground motion and the positions of the crack-up zones in a structure.

1.1 Objectives

Following are the objectives to be studied :

1. Generation of three dimensional models of buildings for idealization to analyze time history and Pounding Effect using Etabs
2. Performing time history analysis and Pounding Effect using analysis for idealization for medium soil at Zone V.
3. Analyzing the displacement of buildings for fourteen Storey (G+14) and seven Storey(G+7) building cases to permit movement, in order to avoid pounding due to earthquake.
4. Performing Pounding Effect using time history FNA for both buildings idealization for three lateral load pattern on the models i.e LL,DL andEL
5. Comparison all graphs and table values for Max displacement, story shear etc
6. And PGA, PGV for pounding effect.

2. LITERATURE REVIEW

Viviane Warnotte et.al., (2013) [1],

He identified the elimination of columns gives much good aesthetical look to the structure Plain celling sealing scatters the light easily, construction is easier and form work is cheaper. Depending on the area and presence of elements, many countries have adopted their own procedures to design builings on their own guide lines are established in their respective codes (due to pounding). So (non – elastic analysis is) conducted to have gap between the structures.

Robert Jankowski et.al., (2015) [2],

The basics questions disquite the request of the non linear analysis and its usefulness and restrictions in seismic pounding gap between buildings. In this study, visco elastic effect is applied to collision. The consequence of the study to tell that pounding is having a impress on behavior of the building. **Shehata E et.al., (2016) [3],**

They convey a limit study on structures pounding reaction as well as perfect tectonic hazard for adjoining structures. Three groups were put down while techtonic was utilized for input. He) advised the corollary of collison (using linear and nonlinear) touch (force model for) various segregation gaps. **Anagnostopoulos Sa et.al., (2017) [4],**

They proselytize the structure as bear-mass, (MDOF) systems with additive force- changing characteristics and with base support rocking spring. Impact in neighbouring buildings can cause at any measure and are intimated by me visco elastic collison materials. **Hasan et.al., (2017) [5],**

The study is on normal displacement condition of elastic analysis. To get the degree the plastic factor is adopted. The quality stretchy and graphic rigidity matrices for building materials are modified to for non-linear behavior under gravity loads.

Korkmaz et.al., (2018) [6],

The ground (motions to) investigates the consequences of the parameters like (building) arrangement and size, segregation length and consequence of materials characteristics. It was establish that pounding tends to have high over stresses, into the codes, combo with the important directions, to the earthquake segregation.

3. METHODOLOGY

3.1 Time History Analysis

The current study analyzes seismic signals and examination of lateral load according to seismic code IS 1893 (Part 1):2002 bare structures and adjacent structures that attempt to investigate the result of seismic load. Efficiency and need are assessed by examination of nonlinear static analysis.

This is called dynamic nonlinear analysis. This technique is also applicable for analyzing structural seismic. In order to execute such analysis, time history of seismic is needed for estimation. Time history analysis process is analyzing the structure for dynamic response of given charge.

The study of time history helpful to overcome all the defects of the continuous study of the model response.

This method requires more computational effort at isolated times to measure the values. The important advantage of such a method is that it provides safety for the designing and analyzing technique mentioned by IS1893 (Part1). This is important when considering the effects of interactions between resulting stresses. The study of time history is useful for controlling complex response of structure to arbitrary charges.

3.2 Building Description

The building used in this study is Eight storied. All building models have same floor plan.

3.2.1 The data is taken for the analysis is as follows:

Grade of concrete G+14	M25
Grade of concrete G+7	M35
Grade of steel	Fe415
Beam G+14	0.4x0.6 m
Beam G+7	0.27x0.4 m
Column G+14	0.6x0.6 m
Column G+7	0.4x0.4 m
Slab thickness	200mm
Story Height	3m

3.3 Seismic Loads

Seismic design shall be done in accordance with IS: 1893:2002. The building is situated in earthquake zone V. The parameters to be used for analysis and design are given below (As per IS: 1893:2002 (Part I).

Zone	V
Zone Factor	0.36
Importance Factor	1.5
ResponseReduction Factor	**5.0**

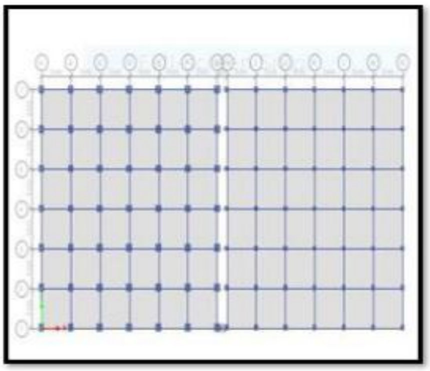
Soil Type	Medium
Structure Type	RC Frame Structure

4. MODELLING AND ANALYSIS

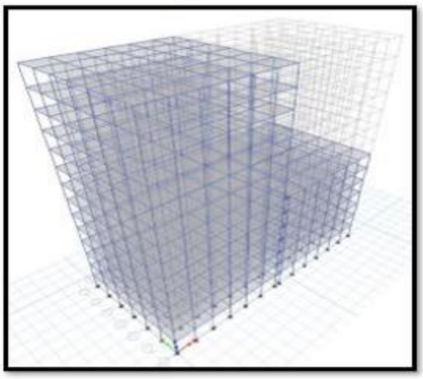
ETABS follows the basic procedure of model analysis, design and detailing through the following steps.

1. Start up with ETABS
2. Set up grid lines
3. Selection and defining the material properties
4. Selection and defining the section properties
5. Assigning the section properties
6. Defining of load patterns
7. Defining of load combinations
8. Assigning of loads analysis of model

4.1 MODELS FOR ANALYSIS



(a) : Plan



(b) : 3D View

Fig -4.1: Model S1 (Conventional RC Structure)

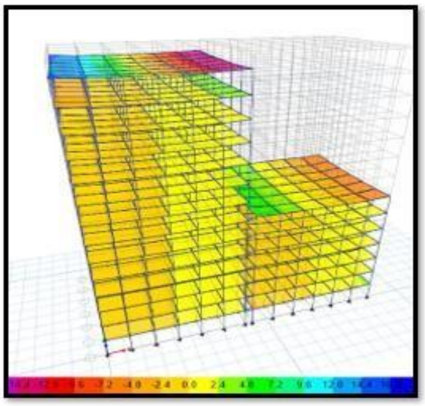


Fig -4.1.1: Variation of Model S1 Due to Dead Load

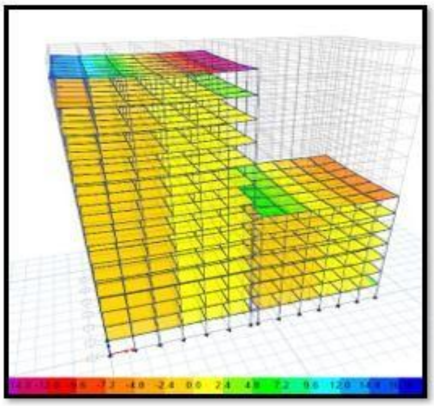


Fig -4.1.2: Variation of Model S1 Due to LiveLoad

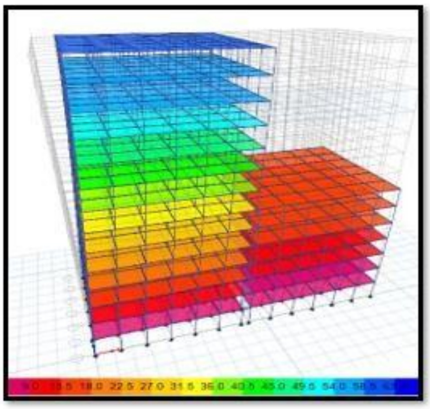


Fig -4.1.3: Variation of Model S1 Due to Seismic Load in X-Direction

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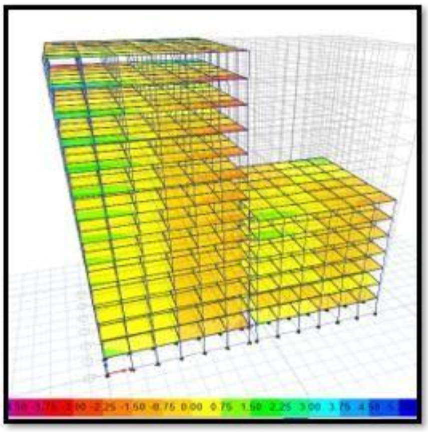
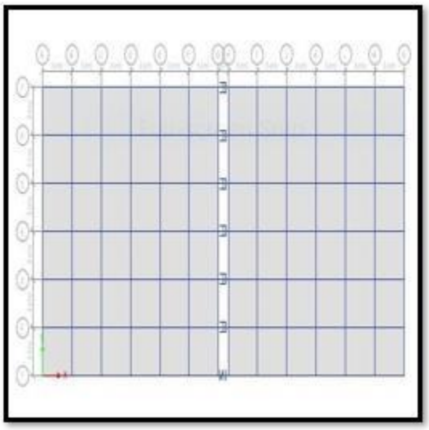


Fig -4.1.4: Variation of Model S1 Due to Seismic Load in Y-Direction



(a) : Plan

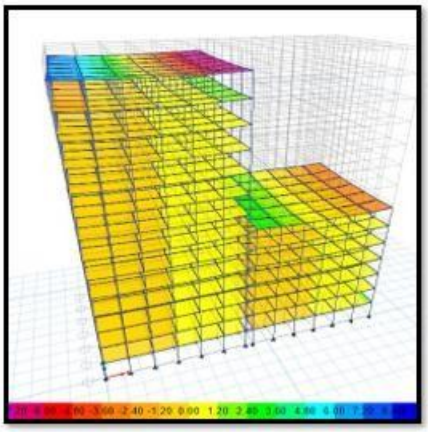
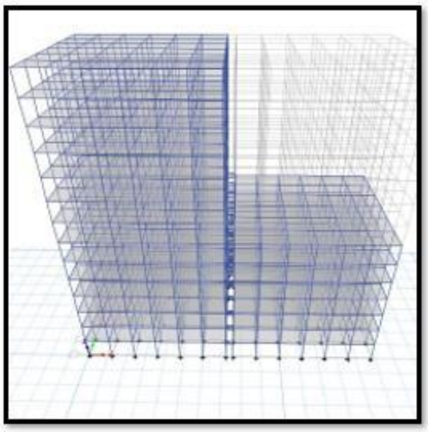


Fig -4.2.1: Variation of Model S2 Due to Dead Load



(b) : 3D View

Fig -4.2: Model S2 (Damper RC Structure)

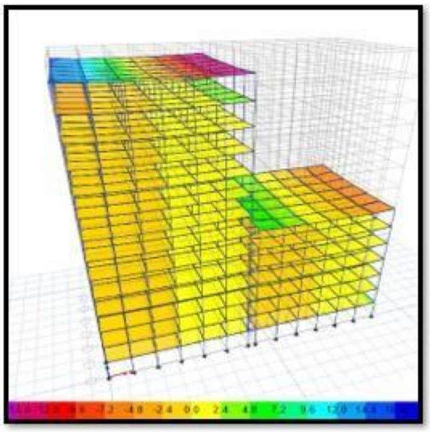


Fig -4.2.2: Variation of Model S2 Due to LiveLoad

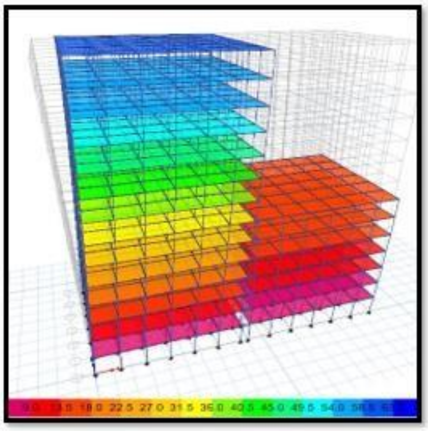


Fig -4.2.3: Variation of Model S2 Due to Seismic Load in X-Direction

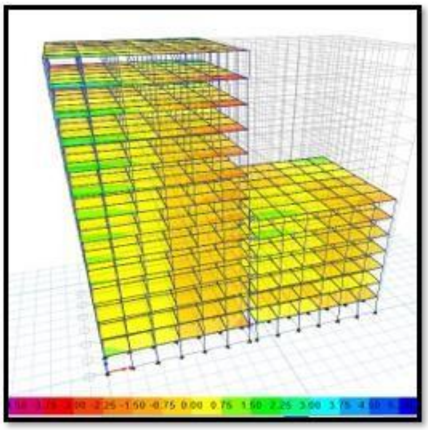


Fig -4.2.4: Variation of Model S2 Due to Seismic Load in Y-Direction

5. RESULTS AND DISCUSSIONS

5.1 Storey Displacement

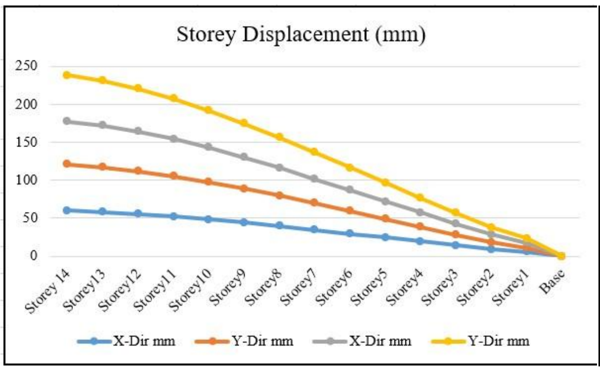


Fig -1: Storey Displacement

5.2 Storey Drift

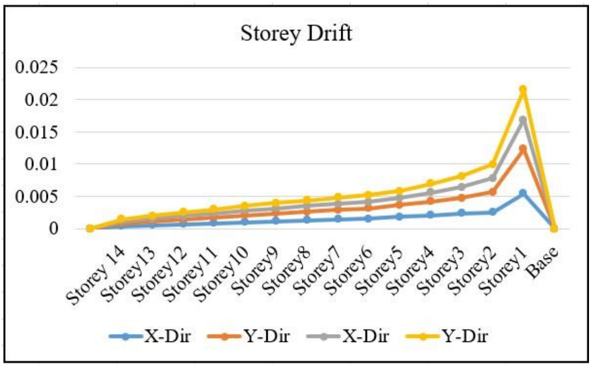


Fig -2: **Storey Drift**

5.4 Storey Stiffness

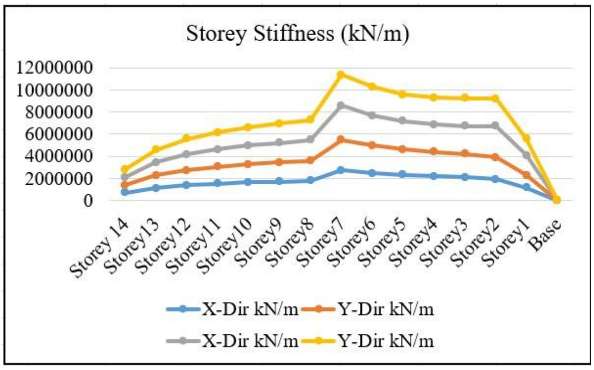


Fig -4: **Storey Stiffness**

5.6 Pounding Effect of 7 Storeys

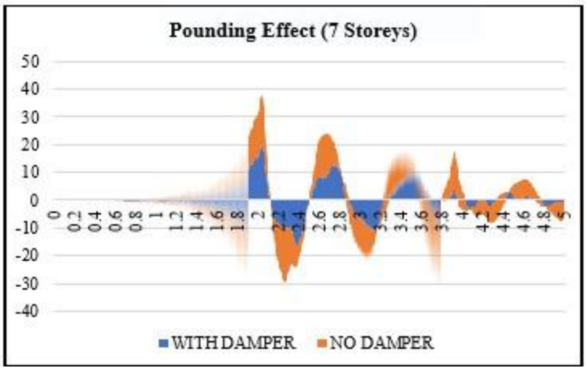


Fig -7: **Pounding Effect (7 Storeys)**

5.5 Pounding Effect of 14 Storeys

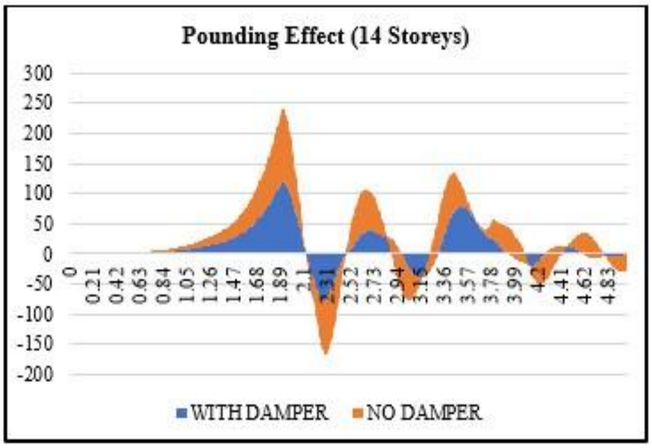


Fig -6: **Pounding Effect (14 Storeys)**

6. CONCLUSIONS

1. The separation distance between the two structures decreases, the amount of impact is increases, which is not applicable in all cases. It is only applicable when the impact time is same. It may also decreases when separation distance decreases, which leads to less impact time.
2. At resonance condition the response of the structure is more and may lead to collapse of the whole structure. In this case even though the predominant time period range is not present, the impact occurs, but this impact is more when the predominant time period structures present.
3. For earthquake data, the Pounding Effect in PGA value and duration are less than no damper model but the collision is significant..
4. For given Viscous Damper Displacement, Drift, shear and stiffness are less and predominant time period structures are near to the existing structures. Hence proving Damper will reduce the Collison and Ponding effect.
5. For Given earthquake which are less magnitude and duration than No damped structure, the collision is more in No damped model because of resonant frequencies. The amount of impact is not only depending on response and velocity of the structure but also magnitude and duration of earthquake.
6. From the all above observation, the damped model holds good for the structure which are adjacent to each other and providing the Damper in adjacent gap only will reduce the Pounding effect for 14 storey and 7 storey buildings.

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