

A REVIEW ON ANALYSIS OF ASYMMETRIC CANTILEVER STRUCTURE WITH SHEAR WALL AT DIFFERENT LOCATIONS FOR HIGH-RISE BUILDINGS

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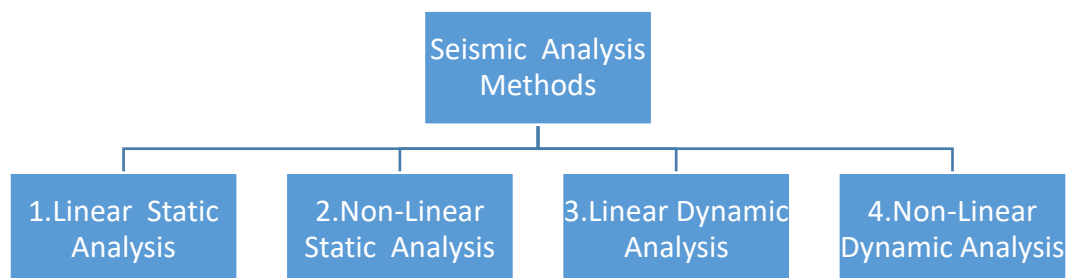
ABSTRACT

An Earthquake can cause damage or collapse of buildings if not designed for lateral loads. The Shear walls are the structural elements which counters the effect of lateral loads such as wind and earthquake loads acting on a structure. They are usually provided as a shaft for the elevator cores, stairwells etc., wherein they resist the horizontal and vertical forces effectively. In the present study, analysis of Asymmetrical Cantilever Structure will be carried out by changing the locations of shear walls in the building. In Asymmetrical structures it's very important to decide effective and perfect location of shear walls. Due to improved lateral stiffness and lateral strength the concrete shear wall will better seismic performance. A commercially available software package ETABS will be used for this purpose. The study will be carried out as per IS: 1893-2016 for the Zone IV and Hard Soil. This study may be useful for seismic design and help to provide guidelines to assess more accurately the seismic performance and vulnerability of cantilever structure. The seismic analysis performed is linear dynamic. A comparative study will be made on responses obtained by seismic analysis from the shear wall at different locations of an asymmetrical high-rise building. Seismic performance of the building will be investigated based on parameters such as time period, storey drift, base shear and joint displacement maximum in both directions.

Keywords: Analysis, Cantilever Structure, Lateral Stiffness, ETABS.

I. INTRODUCTION

The seismic reaction relies on a seismic zone, importance factor, ground type, behaviour component and on the magnitude in addition to the distribution of stiffness and loads of constructing. In urban areas the usage of space in recent times has brought about many changes in the homes we need greater capability in less space which makes buildings uneven, this could cause homes with irregular distributions of their mass, stiffness and power alongside the height of building and purpose interruption of pressure waft and strain concentrations. while regular constructing preparations are almost symmetrical about the axis and make sure uniform distribution of the lateral force-resisting shape elements which deals a regular load route for each gravity and lateral masses. a few studies have targeted on assessing the response of "normal" systems.



OBJECTIVE OF THE STUDY:

The main objective of this research is to study various seismic responses of regular and irregular structure and to analyze the behavior of the structures by adopting the methodology such as pushover analysis, response spectrum etc. to minimize the effects caused by seismic forces.

Moreover, the objective is figured out as follows

- To become aware of extra shear due to tensional response in columns.
- have a look at effects curved beams at every re-entrant nook.

- expertise behavior of shear partitions as Stiff Resisting factors.
- To pick out the proper building configuration from this observe.
- To analysis trade in parameters inclusive of displacement, Bending moments, and shear forces, storey flow and so forth. in L-shaped and T- fashioned building structure.
- To have a look at the reaction of those structures with varying stiffness subjected to gravity hundreds and seismic loading the use of ETAB. Evaluation between model is analyzed using code IS: 456-2000 & IS: 1893-2016 Part1. The various seismic parameters along with soil conditions, seismic region, importance element and so on might permit us to advise the nice suitable building configuration.

II. LITERATURE SURVEY

Ratnesh Pathak, Behaviour of Asymmetric Building during Earthquake (May 2019)

The paper examines the seismic analysis of the asymmetrical constructing, in which constructing have 3 distinctive form which includes T, L and plus form. Researcher supplied each re-entrant corner supplied curved beam with slab. the primary purpose of imparting curve beam in each model to lessen the specially torsion at nook due to the fact storey overturning moment is most at the base and if the torsion is also maximum at the base, then maximum possibilities to produce the crack at the re-entrant corner of the constructing. There are six models in this paper and taking zone 5 for seismic evaluation. all the analysis of the fashions is completed with the assist of the ETABS software by way of the usage of one of a kind IS Code consisting of IS CODE 1893 part1: 2016 for the earthquake resistant layout of the structure and IS CODE 456:2000 for design and evaluation of the reinforced concrete shape. observe consists of the version of torsion of body at corner, storey overturning second, base shear, and so on due to offer the curved beam and without curved beam.

Purushotham Dewangan, Seismic Analysis of Regular and Irregular structures and its comparison (Sep 2018).

the main goal of earthquake engineering is to layout & build a structure in such a manner that the damage to the structure and its structural issue during an earthquake is minimized. creation can suffer various damages whilst they're subjected to Seismic excitations. For the identical structural configuration, location & earthquake, damages inside the systems are neither same nor homogeneous. Seismic analysis of constructing has now end up an essential component in gift era of modern-day Structural designs; it's far due to the fact earthquake causes plenty of damages and lack of existence. Multi-storey structures built by using reinforced Cement Concrete are subjected to severe movements of Seismic waves all through earthquake. the primary cause for the failure of RC building is Irregularity. The Irregularities can be in its plan measurement, lateral pressure distribution. After proper change the bending second potential of re-entrant corner column is increased. Base Shear for normal shape is extra than that of abnormal structure. Base Shear for changed structure is greater than that of original shape. Ductility ratio and reaction discount issue is more for everyday shape. abnormal structures can behave as a everyday structures if proper precautions and changes are made.

Vaishnavi Vishnu Battul, Study of Seismic Effect on Re-entrant Corner Column (April 2018).

The take a look at mainly focuses on the irregularities in buildings. Irregularities are usually predicted because of many reasons like aesthetics, mild, air flow, and so on. The irregularity is because of the purpose the stiffness middle and mass middle of the constructing isn't always at the same place. consequently, it's far had to examine behavior of such structures during earthquake. The objective of this takes a look at is to understand plan irregularity and to investigate the seismic performance of the abnormal frame using nonlinear static evaluation in SAP2000. The study includes identification and measure of the irregularity degree due to the irregular plan and improvement of the structural gadget considering seismic conduct. Irregularity in plan is unavoidable. it's far due to many reasons like requirement of purchaser, purposeful necessities, and so forth. Due care is needed while designing such structures. it is found from above take a look at that fore-entrant nook columns want more interest than the opposite columns. those columns must be designed properly. After right modifications the bending second potential of re-entrant corner column is expanded by means of 1.5 and twice in case of IS456 and IS13920 respectively. Base Shear for normal systems is extra than that of abnormal structures. Base shear for modified systems is more than the unique structures.

Sabahat J. Ansari, Dr. S. D. Bhole, Comparative Study of Symmetric & Asymmetric L- Shaped & T-Shaped Multi-Storey Frame Building Subjected to Gravity & Seismic Loads with Varying Stiffness (April 2016).

This paper presents an overview of overall performance of the torsion best friend balanced and unbalanced homes additionally referred to as as symmetric and uneven buildings subjecting to seismic analysis. In gift situation, maximum of the buildings are frequently built with irregularities which include smooth storey, torsion al irregularity, unsymmetrical format of in-fill partitions, vertical and plan irregularity, and many others. past earthquake research shows that the maximum of the RC homes having such irregularities had been significantly broken underneath the seismic ground motion. 3 building fashions for L-shaped and T-fashioned constructing are taken into consideration for observe, that are built on medium soil in seismic region III of India (as in line with IS: 1893-2002[9]), one symmetric and three asymmetric in stiffness distribution. in this paper it's far concluded that the overall performance of the fashions wherein the stiffness of plan length taken into consideration is determined better whilst as compared with the fashions wherein the stiffness of plan length omitted.

B K Raghu prasad, Vinay S, Amarnath.K, Seismic Analysis of Buildings Symmetric & Asymmetric in Plan (May 2016).

In this paper the inelastic seismic behaviour of symmetric and asymmetric single & multi-storied buildings is studied. The effects of torsion on buildings are investigated. There is an increase in shear in columns and the rotation of columns need some special attention. The natural frequencies of an asymmetric spring model are greater than those of symmetric spring model while the rotations about the vertical axis through the mass centre of an asymmetric model are lesser than those of symmetric model. Similarly, maximum displacement of an asymmetric spring model due to an earthquake is greater than that of symmetric spring model.

Chaithra S, Behavioural Analysis on Asymmetrical Buildings with Solid, Coupled and Shear Wall with Staggered Openings (Aug 2016).

The venture considers the Behaviour of an uneven multistoried buildings without shear walls and with stable, coupled and shear wall with staggered openings beneath static and dynamic loads. Shear partitions are vertical contributors supplied in the homes to resist the lateral hundreds specifically in the activities of earthquake and wind. they'll be strong or with openings. functionality is maintained by the provision of openings. Coupled shear walls are one among such gadget normally utilized in medium and high-rise systems to withstand lateral forces. these structures must not disintegrate or be inclined all through intense harm in the course of earthquake actions. because of this, coupled shear partitions need to have high electricity, excessive ductility, excessive electricity absorption capability and excessive shear stiffness to limit lateral deformations. If the depth of the coupling beam varies there may be an impact at the perspective of inclination furnished inside the diagonal reinforcement and as a result coupled partitions are studied at one-of-a-kind depths of coupling beam. A comparative approach is developed to understand the effect of staggered commencing in a shear wall. Staggered association of openings in shear partitions satisfies both the architectural and the seismic necessities. A comparative observe is executed on multistoried buildings without shear wall and with stable, coupled, and staggered commencing shear wall.

Sharath IrrappaKammar, Non-Linear Static Analysis of Asymmetric Building with and without shear wall (June 2015)

The goal is to study the performance stage and behavior of structure in presence of shear wall for plan abnormal constructing with re-entrant corners. The parameters taken into consideration in this paper are Base shear, Displacement and performance stages of the structure. The seismic codes for irregularities are as in line with the clauses defined in IS-1893:2002 and pushover evaluation manner is accompanied as consistent with the prescriptions in ATC-forty. The hinge residences are implemented via default technique as per codal provisions in FEMA 356. The model is analysed the usage of SAP2000 software. in this paper it is proposed that base shear of the building boom with the addition of the shear wall as the load resisting capability increases. The addition of shear wall drastically reduces the displacement inside the systems when as compared with the structures without shear wall. The overall performance point of the models without shear wall could have base shear less in comparison to version with shear wall because the shear wall resists the earthquake forces to

more volume. From effects, it's miles determined that the homes with re-entrant corners are more prone to earthquake damage inflicting Torsion impact.

Dileshwar Rana, Seismic Analysis of Regular & Vertical Geometric Irregular RCC Framed Building (July 2015).

This painting suggests the overall performance & Behaviour of regular & vertical geometric irregular RCC framed structure under seismic movement. 5 kinds of constructing geometry are taken in this task: one regular frame & 4 irregular frames. A comparative observe is made between a majority of these building configurations peak smart and bay sensible. All building frames are modelled & analysed. various seismic responses like shear force, bending second, storey float, storey displacement, and so on. are acquired. The seismic analysis is accomplished in line with IS1893:2002 element (1). Seismic region IV & medium soil strata are taken for all of the instances. The change in the extraordinary seismic response is observed alongside distinctive top. The evaluation of results has been achieved storey wise for each bay and then bay clever for identical building height. it is concluded that as the amount of setback increases the shear pressure additionally will increase. The fluctuation of crucial shear force from normal to vertical geometric irregular may be very high.

Arvind Reddy, Seismic analysis of RC regular and irregular frame structure (Aug 2015).

the primary objective to perform this evaluation is to locate integrated displacement vs. base shear graph and additionally time history evaluation can be carried out disintegrated BHUJ earthquake. For time history analysis beyond earthquake floor motion document is taken to built-in response of all of the structures. presently there are six fashions. One is of everyday integrated structure and built-in integrated are irregular structural models. This paper built integrated that behavior irregular systems built-in to normal structure, it is able to be concluded that structure 7fd5144c552f19a3546408d3b9cfb251 with stiffness irregularity will be on non-conservative facet and as seen from time records analysis, as storey built-inbuilt integrated conduct of stiffness irregularity and diaphragm irregularity will become reverse.

Neha P Modakwar, Seismic Analysis of Structure with irregularities (2014)

The objective of this examine is to recognize one-of-a-kind irregularity and torsion al reaction because of plan and vertical irregularity and to analyse go shape and L form constructing whilst earthquake forces acts and to calculate additional shear because of torsion within the columns. This examine changed into initiated to quantify the impact of different tiers of irregularity on structures designed for earthquake using simplified evaluation. in this paper it's miles proposed that the Re-entrant corner columns are had to be stiffened for shear force in the horizontal path perpendicular to it as substantial version is visible in those forces from the torsion point of view the re-entrant corner columns ought to be support at lower ground levels and pinnacle floor degrees and from the evaluation it's miles discovered that Behaviour of torsion is identical for all zones. Equation generated from the graph shall be used for calculating values of shear forces, moments and displacements in diverse zones. effect of torsion is a whole lot extra when diaphragms at a few stages are removed, so in re-entrant corner building it's miles higher to avoid irregularity in diaphragm.

Dr. B.G. Naresh Kumar and Avinash Gornale, Seismic Performance Evaluation of Torsion ally Asymmetric Building (June 2012).

This paper provides an overview of overall performance of the torsion best friend balanced and unbalanced buildings also called as symmetric and uneven homes subjecting to pushover evaluation. The homes have un-symmetric distribution of stiffness in storeys. on this the take a look at the impact of eccentricity between centre of mass (CM) and centre of story stiffness (CR) and the impact of stiffness of in-fill partitions at the overall performance of the building is presented. the required area of reinforcement in decided on columns is more when designed for gravity and earthquake hundreds compared to corresponding models designed only for gravity loads. it's miles therefore crucial to don't forget the seismic loads within the layout of medium upward push homes.

Dr. S.K. Dubey, P.D. Sangamnerkar, Seismic Behaviour of Asymmetric RC Building (Dec 2012)

observe is performed to apprehend extraordinary irregularity and torsion al reaction because of plan and vertical irregularity and to research "T"-shaped constructing while earthquake forces acts and to calculate additional shear due to torsion in the columns. extra shear due to torsion al moments desires to be considered

because this increases shear forces which causes columns to collapse. on this paper it is proposed that homes with irregularities are at risk of earthquake damage as observed in lots of earthquake occurrences. since cutting-edge codes fall quick of imparting simplified analytical gear for abnormal systems. it's miles vital to develop a simple analytical procedure based totally on rigorous computations and experiments on the seismic reaction of abnormal systems.

III. CONCLUSION

- 1) Select a regular building and compare it with irregular building.
- 2) Perform Response spectrum analysis for regular building models taken in this study.
- 3) Pushover analysis is done for irregular building.
- 4) Presentation of the results with the help of graphs and tables considering all the included parameters such storey overturning moment, base shear, storey stiffness, bending moment, displacement in structure etc.

IV. REFERENCES

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