A STATIC HIGH RISE CONSTRUCTION OF SUPER STRUCTURES IN PARTICULAR AREA

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ABSTRACT

Basic dynamic is a compulsory graduate level course for auxiliary designing understudy all around the globe. In structural building structures are for the most part outlined in light of prescriptive techniques for standard codes. Normally stacks on these structures are of low greatness which brings about flexible auxiliary conduct. Be that as it may, solid loads, for example, a sudden seismic tremor will lead the structure past its flexible point of confinement. For the most part 4 sorts of seismic tremor ground movements are viewed as, for example, Fault Normal, Fault Parallel, Near Fault and Far Fault segments.

In the present examination the execution of a structure in a solitary level of flexibility framework is explored under various ground movements, for example, Fault typical and Fault parallel part of the ground movement by powerful time history investigation technique and the examination is done in the SEISMOSTRUCT programming created by the SEISMOSOFT Company.

The Acceleration, Velocity and uprooting bends have been drawn for both Fault Normal and Fault Parallel segment of Far Fault and Near Fault ground movement. The estimations of increasing speed, speed, removal have been found in at regular intervals, likewise the estimations of Peak Ground Acceleration, Peak Ground Velocity and Peak Ground Displacement has been resolved for the two parts.

The estimations of PGA, PGV, PGD acquired for blame ordinary segment are higher than the qualities got for the blame parallel part of the ground movement, additionally the frequencies of blame typical segment of ground movement are more than that of the blame parallel segment of ground movement.

The estimations of Peak Ground Acceleration, Peak Ground Velocity and Peak Ground Displacement of Fault Normal and Fault parallel segments don't vary much for Far Fault seismic tremor ground movements, however they contrast much for Near Fault Earthquake ground movements. The reaction range bends are diverse for every sort of tremor ground movements, henceforth it implies that the structure have distinctive reactions to every sort of quake ground movements.

Introduction

1.1 General:

An earthquake is the result of an unexpected release of energy in the Earth's crust that creates seismic waves. The seismicity or seismic action of an area refers to the frequency, type and size of earthquakes practiced over a period of time.

Earthquakes are measured using remarks from seismometers. The moment magnitude is the most common scale on which earthquakes greater than approximately 5 are reported for the entire globe. The more earthquakes smaller than magnitude 5 stated by national seismological observatories are measured mostly on the local magnitude scale, also referred to as the Richter magnitude scale. These two scales are numerically similar over their range of legitimacy. Magnitude 3 or lower earthquakes are mostly almost unnoticeable or weak and magnitude 7 and over potentially causes severe damage over larger areas, dependent on their depth.

The largest earthquakes in historic periods have been of magnitude slightly over 9, although there is no boundary to the possible magnitude. The most recent large earthquake of magnitude 9.0 or larger was a 9.0 magnitude earthquake in Japan in 2011 (as of March 2014), and it was the major Japanese earthquake since records started. Intensity of shaking is measured on the modified scale. The shallower an earthquake (also known as a quake, tremor or temblor) is the result of a sudden release of an earthquake, the more destruction to structures it causes, all else being equal.

At the Earth's surface, earthquakes manifest themselves by trembling and sometimes displacement of the ground. When the epicenter of a large earthquake is situated offshore, the seabed may be displaced adequately to cause a tsunami. Earthquakes can also trigger landslides, and occasionally volcanic movement.

In its most general sense, the word earthquake is used to define any seismic event — whether natural or caused by humans — that produces seismic waves. Earthquakes are caused mostly by rupture of geological faults, but also by other actions such as volcanic activity, landslides, minblasts, and nuclear tests. An earthquake's point of primary rupture is called its focus or hypocenter. The epicenter is the point at ground level right above the hypocenter.

Objective and Scope:

To study the differences in structural responses against different earthquake ground motions and we compare the results as follows:

Far-field/Near-field

Fault-parallel/Fault-normal

To perform dynamic time history analysis on a structure in single degree of freedom system with the use SEISMO STRUCTURE software.

To compare the associated Response Spectrums for Fault Normal and Fault Parallel components of both kinds of earthquake ground motions.

LITERATURE REVIEW:

General

Durgesh C. Rai (2005) has developed guidelines for seismic evaluation and firming up of buildings. The document was established as part of project "Review of Building Codes and Preparation of Commentary and Handbooks" presented to Indian Institute of Technology Kanpur by the Gujarat State Disaster Management Authority (GSDMA), Gandhinagar through World Bank finances. This document is predominantly concerned with the seismic evaluation and strengthening of current buildings and it is proposed to be used as a guide.

Douglas Dreger, Gabriel Hurtado, Anil K. Chopra, Shawn Larsen, 2007 studied Near fault seismic ground motion and got that For a vertical strike-slip fault the FN ground motions are the same on each side of the fault, whereas the FP component doesn't have equal amplitude but contrary static offset. The corresponding velocity pulses are the equal on each side of the fault for the FN component, but opposite in sign on the FP component. This degree of symmetry vanishes when the fault is dipping due to the uncontrolled free-surface. Motions on the hanging block side are greater due to the free-surface effect, and because a larger fraction of the fault surface is nearer to the stations on the side of the fault that dips under the recording stations.

Kim and Elnashai (2009) observed that buildings for which seismic design was performed using contemporary codes persisted the earthquake loads. However the vertical motion significantly reduced the shear capacity in vertical members.

Abu Lego (2010) Site Response Spectra was used to study the response of buildings because of earthquake loading. . According to the Indian standard for Earthquake resistant design (IS: 1893), the seismic force or base shear rest on on the zone factor (Z) and the average response acceleration coefficient (Sa/g) of the soil kinds at thirty meter depth with suitable adjustment depending upon the depth of foundation. In the present study an effort has been made to generate response spectra using site definite soil parameters for some sites in Arunachal Pradesh and Meghalay in seismic zone V and the generated response spectra is used to analyze some structures using the design software STAAD Pro.

Mr. S. Yaghmaei-Sabegh and MR. N. Jalali-Milani, 2012 studied Pounding force response spectrum for near-field and far-field earthquakes and got the result that insufficient separation distance between neighboring buildings with out-of-phase response would rise the probability of pounding during an earthquake and may cause serious damages to the structures. A rational estimation of the maximum impact force would support us to control the extent of damages in different structures. The pounding force response spectrum, which shows the value of maximum impact force as a function of the structural vibration stages, is considered in this paper. It is well-known that solid ground motion in the near-field area has different characteristics from far-field ones. In this paper, pounding force response spectra for elastic structures subjected to near-field and far-field ground motions are shown. Both of the neighboring buildings were modeled simply as Single Degree Of Freedom (SDF) systems and pounding effect has been replicated by applying the nonlinear viscoelastic model. In the analysis, the effect of altered parameters, such as mass, damping ratio has been studied. The effects of gap distance on maximum pounding force due to near- and far-field earthquake ground motions were studied comprehensively. As a result, the characteristics of earthquake ground motions alongside with the properties of structures should be considered in gap distance controlling amongst adjacent buildings.

Mr. J.C. Reyes and Mr. E. Kalkan, 2012 studied Relevance of Fault-Normal/Parallel and Maximum Direction Rotated Ground Motions on Nonlinear Behavior of Multi-Story Buildings and got that The existing state-of-practice in U.S. is to rotate the as-recorded couple of ground motions to the fault normal and fault-parallel (FN/FP) directions before they are used as input for three-dimensional nonlinear response history analyses (RHAs) of structures. It is presumed that this approach will lead to two sets of responses that cover the range of possible responses over all non-redundant rotation angles. Thus, it is considered to be a conservative method appropriate for design verification of new structures. Based on the 9-story symmetric and asymmetric buildings, the effect that the angle of rotation of the ground motion has on several engineering demand parameters (EDPs) has been observed in nonlinear-inelastic domain.

3.0 About the Software:

Seismo Structure is Finite Element package capable of calculating the large displacement behavior of space frames under static or dynamic loading, taking care of both geometric nonlinearities and material inelasticity. Concrete, steel and FRP material models are existing, together with a huge library of 3D elements that can be used with a wide variety of pre-defined steel, concrete and composite section configurations. The program has been widely quality-checked and validated, as described in its Verification Report. Some of the more vital features of SeismoStruct are shown in what follows:

- Completely visual interface. No input or configuration files, programming scripts or any other time-taking and complex text editing necessities.

- Full combination with the Windows environment. Input data created in worksheet programs, such as Microsoft Excel, may be pasted to the SeismoStruct input tables, for stress-free pre-processing. Conversely, all information available within the graphical interface of SeismoStruct can be copied to software applications (e.g. to word processing programs, such as Microsoft Word), including input and output data, high quality graphs, the models' deformed and undeformed shapes and much more are available.

- With the Wizard facility the user can generate regular/irregular 2D or 3D models and run all types of analysis on the fly. The whole procedure takes no more than a few seconds.

- Seven different kinds of analysis: dynamic and static time-history, conventional and adaptive pushover, incremental dynamic analysis, eigenvalue, and non-variable static loading.

- The applied loading consist of constant or variable forces, displacements and accelerations at the nodes. The variable loads can vary proportionally or independently in the time domain.

- The program can help in both material inelasticity and geometric nonlinearity.

- A large number of different reinforced concrete, steel and composite sections are available.

- The spread of inelasticity along the member length and across the section depth is clearly modelled in SeismoStruct allowing for precise estimation of damage accumulation.

- Numerical stability and exactness at very high strain levels enabling accurate determination of the collapse load of structures.

- The innovative adaptive pushover procedure. In this pushover method the lateral load distribution is not kept constant but is continuously updated, according to the modal shapes and participation factors determined by eigenvalue analysis carried out at the current step. In this way, the stiffness state and the period elongation of the structure at every step, as well as higher mode effects, are accounted for. In particular the displacement-based variant of the approach, due to its ability to update the lateral displacement patterns according to the constantly changing modal properties of the system.

RESULTS

After performing response spectrum analysis we have got the output data for both fault normal and fault parallel components of Far Fault ground motions, and also the response spectrum curves were obtained which are shown in the following figures

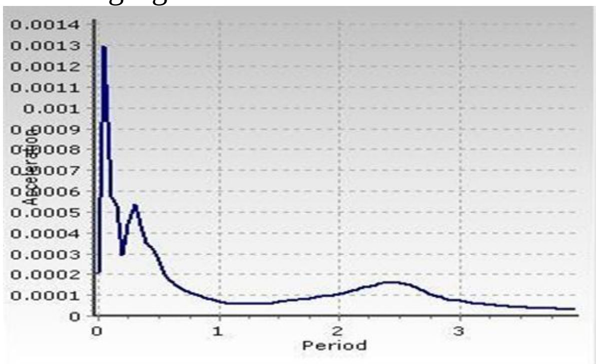


Figure shows Response spectrum curve

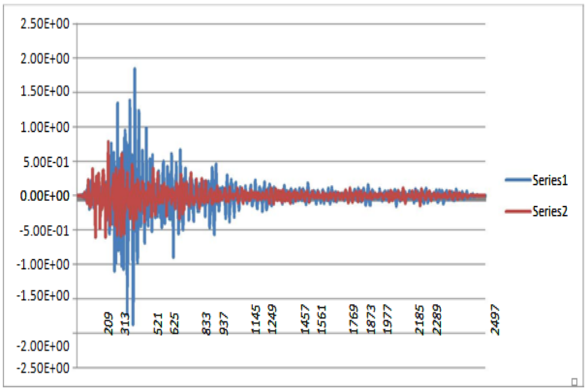
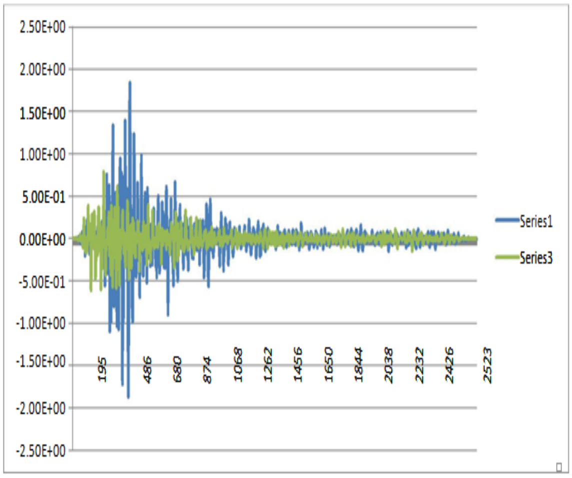
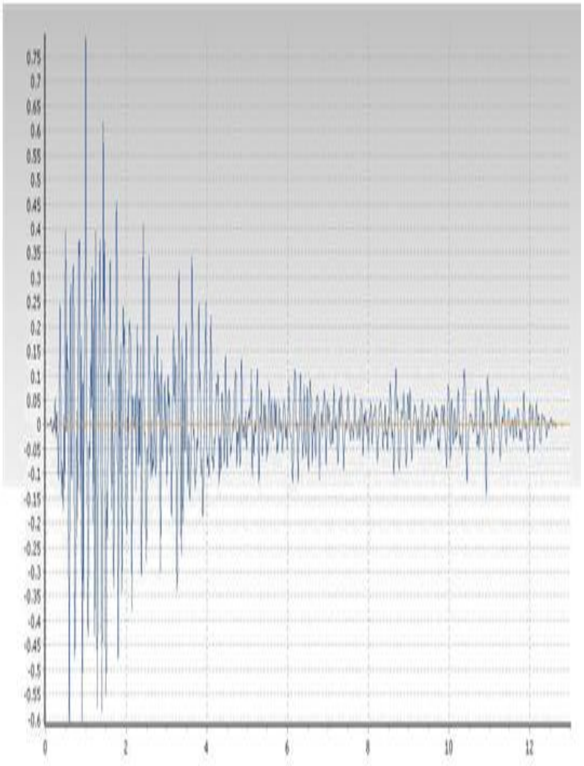


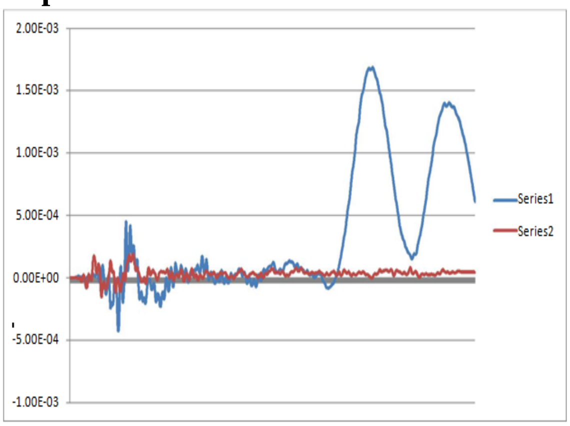
Figure shows Acceleration curve



Graph shows Acceleration curve



Graph shows Acceleration curve



Graph 5 shows Velocity Curve

SUMMARY AND CONCLUSION:

- In the current study the performance of a structure in a single degree of freedom system is investigated under different ground motions such as Fault normal and Fault parallel component of the ground motion by dynamic time history analysis method and the analysis is done in the SEISMOSTRUCT software developed by the SEISMOSOFT Company.
- The Acceleration, Velocity and displacement curves have been drawn for both Fault Normal and Fault Parallel component of Far Fault and Near Fault ground motion. The values of acceleration, velocity, displacement have been found in every 0.005 seconds, also the values of Peak Ground Acceleration, Peak Ground Velocity and Peak Ground Displacement has been determined for both components.
- Finally the response spectrum curves have been drawn for each kind of earthquake ground motions.

CONCLUSION:

- The values of Peak Ground Acceleration, Peak Ground Velocity and Peak Ground Displacement obtained for fault normal component are higher than that of fault parallel component.
- The frequencies for fault normal component are higher than that of the fault parallel.
- The values of Peak Ground Acceleration, Peak Ground Velocity and Peak Ground
- Displacement of Fault Normal and Fault parallel components don't differ much for Far
- Fault earthquake ground motions, but they differ much for Near Fault Earthquake ground motions.

- The response spectrum curves are different for each kind of earthquake ground motions, hence it means that the structure have different responses to each kind of earthquake ground motions.

REFERENCES:

1. Mario Paz,1979, "Structural Dynamics" 2nd Edition, CBS Publishers and Distributors

2. www.sciencedirect.com (8th September 2014)

3. IS1893-2002, Indian Standard CRITERIA FOR EARTHQUAKE RESISTANTDESIGN OF STRUCTURE, Bureau of Indian Standards, Fifth revision

4. En.wikipedia.org/wiki/Fault_(geology) (5th September 2014)

5. www.seismosoft.com (1st September 2014)

6. IS 456 (2000) "Indian Standard for Plain and Reinforced Concrete" Code of Practice,

Bureau of Indian Standards, New Delhi, 2000

7. S. Yaghmaei-Sabegh and N. Jalali-Milani, 2012 "Pounding force response spectrum for near-field and far-field earthquakes"

8. Kalkan, E., and Kwong, N.S., 2012, "Evaluation of fault-normal/fault-parallel directions rotated ground motions for response history analysis of an instrumented six-story building"

9. Douglas Dreger, Gabriel Hurtado, Anil K. Chopra, Shawn Larsen, 2007 "Near fault seismic ground motion"

10. IS 875 (part1), Dead loads, unit weights of building material and stored and stored material (second revision), New Delhi 110002: Bureau of Indian Standards, 1987.

11. IS 875 (part2) Imposed loads (second revision), New Delhi 110002: Bureau of Indian Standards, 1987.

12. J.C. Reyes and E. Kalkan, 2012, "Relevance of Fault-Normal/Parallel and Maximum Direction Rotated Ground Motions on Nonlinear Behavior of Multi-Story Buildings"

13. Chan, C.M. and Zou, X.K. (2004) Elastic and inelastic drift performance optimization for reinforced concrete buildings under earthquake loads. Earthquake Engineering and Structural Dynamics 33,929–950

14. EC8, Design of structures for earthquake resistance, Part 1: General rules, seismic actions and rules for buildings. European committee for standardization, Brussels, 2002
15. Agarwal A. (2012): Seismic Evaluation of Institute Building, Bachelor of Technology Thesis, National Institute of Technology Rourkela