CONTROL SEISMIC LOAD USING ENERGY DISSIPATION IN STRUCTURES

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Abstract:- Seismic waves are waves of energy that travel through the Earth's layers, and are a result of earthquakes, volcanic eruptions, magma movement, large landslides and large man made explosions that give out low-frequency acoustic energy. Many other natural and anthropogenic sources create low-amplitude waves commonly referred to as ambient vibrations. Earthquakes create distinct types of waves with different velocities; when reaching seismic observatories, their different travel times help scientists to locate the source of the hypocenter.

When earthquakes occur, a building undergoes dynamic motion. This is because the building is subjected to inertia forces that act in opposite direction to the acceleration of earthquake excitations. These inertia forces, called seismic loads, are usually dealt with by assuming forces external to the building.

The determination of seismic risk is the foundation for risk mitigation decision-making, a key step in risk management. Large corporations and other enterprises (e.g., local governments) analyze their 'portfolio' of properties, to determine how to best allocate limited funds for structural strengthening of buildings, or other risk reduction measures such as emergency planning. In calculating the risk of each facility in the 'portfolio', potential life safety and economic losses due not only to structural damage, but also to equipment, contents and business interruption are considered. Damper amplification factor and its optimum parameters are used in this method to achieve the goal and fulfill the identified requirements. The energy dissipation systems are devices specially designed and tested to dissipate large quantities of energy. The most common energy dissipation systems are the viscous ones (force proportional to the velocity of deformation) and the hysteretic (force proportional to displacement), however there are also the viscoelastic, electro-inductive and by friction damping systems. Viscous dampers devices consist of a cylinder containing a high viscosity fluid. This operation is simple: during an earthquake, the force generated by the imposed acceleration is transmitted to the damper, which regulates the passage of compressed fluid through small holes. The seismic energy is dissipated, as fast as the liquid flows through the holes.

Key Words:-*Seismic Waves, P- Waves, L- Waves, ADAS Device*.

1- INTRODUCTION

1.1 INTRODUCTION

The waves of the energy which travels through the Earth’s layers are known by the name as Seismic, and are the end results of the earthquake, volcanic eruptions, magma movement, large landslides and large man-made blasts that results the low- frequency of acoustic energy. So many other natural and anthropogenic originates the low- amplitude waves naturally related to as ambient vibrations. This earthquakes creates variant kinds of the waves with the variant velocities; when the hypo-center reaching

seismic observations, their variant travel times assists the researchers to trace the source.

In the situation of the earthquakes, dynamic motions can be seen in the building. This due to of the building which is comparative to inertia force that work in the opposite direction to the acceleration of the earthquake excitations. These inertia forces, known as seismic loads, are generally deals with assuming forces not internal to the building.

The exclusion of the non- wanted vibes from the structures through the seismic loads has been of enhancing significance in the current years, specifically for the slender or otherwise variable structures. This is significant, not only for deducting the dynamic replies of the structures under high pressure, but also for the enhancement of the system reliability and guarantying the human comfort with the daily dynamic loads.

Risk to a building from the damage is because of the Seismic waves. It has been defined as the hidden economic, communal and environmental regulations. On the other side, if the building is situated in the location which have the background of minor seismicity, in a building situated on the subject of fluidity can be on high or high on risk.

A particular subset is urban seismic risk which take the look at the particular of the cities. Risk fixation and emergency replies can be also de definite through the use of the earthquake sequence.

1.1.1 Determination of seismic risk

The foundation of the risk mitigation from the seismic is determination of risk, main step of the risk management, huge companies and other firms (foe an example, local government bodies) observe their portfolio of the belongings, to solve the problem of allocation of scares resources for functional strengthening of the buildings, or other methods of emergency plotting. In the measurement of the risk of every facility in the potential of the portfolio guards the life and losses of economic type not only because of the structural damage, other factors so considered are tools, contents and business communication are concentrated.

In the same way the portfolio of the public agencies are observed. The connection between of infrastructure like as water, road and highway, and electric power systems are also measured. Companies engaged in the insurance sector is continuously employ prediction of the seismic risk in their workings, at fix the insurance rates, to analyses the over.

Insurance companies routinely employ estimates of seismic risk in their operations, to determine appropriate insurance rates, to monitor over-stocking of strategies in an insignificant field, and to buy protection. An easy technique for the estimation of the seismic risk in a given particular city, it also; includes the results of the street survey. The following pattern is establishes if we know the level of the seismic hazard.

The seismic risk is frequently fixes by the use of the seismic structural computer programs which make the use of seismic hazard tools and mixes them with the non-defined weaknesses poles etc. The end result provides the chances for the economic losses or uncertainties, for an instance the HAZUS computer program. For variant type of buildings the results of such tools is used, the seismic risk is vary from building to building and is dependent on its particular configuration and circumstances. To acquit and observation is the particular for a particular building or facility is most costly and discouraging approach of seismic risk calculation. If fragility is calculated by anyone then there is huge chances of the success. Here the fragility means the seismic capacity of the elements in the functional unit.

ASTM in the year 1999, issue guidelines with the great guidelines for the results of the seismic damages on profitable units, usually known as Probable Maximum Loss or PML appraisals. The scope of work is specified by these guidelines, education of researcher, and systematic way for reporting of the damages.

1.1.2 Reduction of seismic risk

Various active programs can be used for the reduction of the seismic risk that enhances the urgency of response and enhance the fundamentals of infrastructure. The theories of the earthquake readiness can assist in the plotting for the urgency originated from an earthquake. To manage the seismic risk the building codes are used and are updated as much as learned about the effects of the seismic ground gesture on buildings. The term used for the activity of the mitigation of damage from the earthquake is called as seismic risk in society subsequently existing buildings are hardly needed to be upgraded to match the researches.

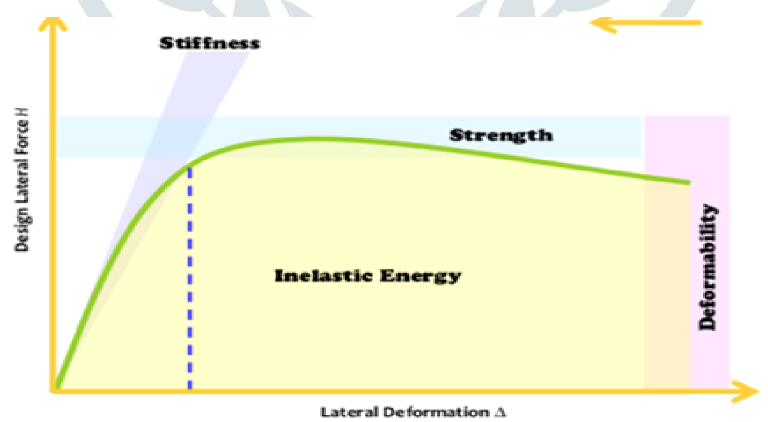


Figure 1.1 Difference in the design effects on a building during natural actions

1.2 Earthquake behavior of Building:

1.2.1 Dynamic Actions on Buildings – Wind Versus Earthquake

Building bears the various actions of wind and earthquakes. But the designs for the both the effect is variant in nature. The spontaneous philosophy of the structural pattern uses the variant forces as the basis, which is suitable in wind patter, where the building is regarded to pressure on its shown field; this is force- kind of loading. Hence, in the earthquake pattern, the building is regarded to the continuous motion on the basis of its base as shown in the Fig.1.2, which uses the force of the inertia in the building that results in the stresses; this type of loading is known as displacement loading. The load deformation curve is theother way of elaborating the difference. On the vertical- axis the demand of building force in force type loading enforced by the pressure of wind, and displacement on the horizontal axis under displacement type loading affected by the shacking [3]

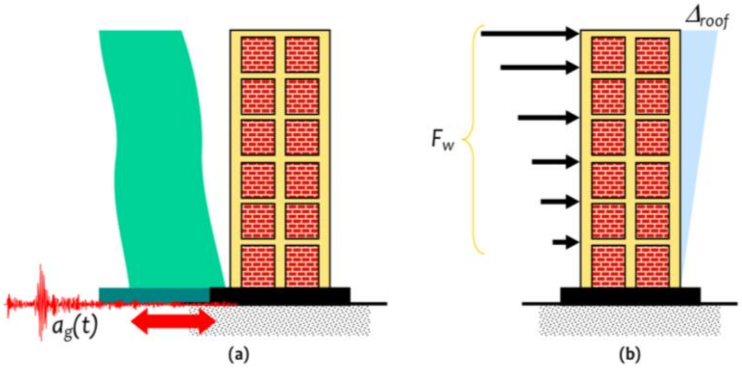


Figure 1.2 Difference in the design effects on a building during natural actions of (a) Earthquake Ground Movement at base, and (b) Wind Pressure on exposed area.

As shown in fig 1.3 the wind force on the building has some non- zero components are placed on the above of the previous one with comparatively small wavering elements presented in Fig. 1.3. Hence, in the stress area the building experiences the small variations, but it can be reversed if the direction of wind is reverses, which can be occur over a long gap of time. On the other side, the movement of the ground is non- stable as it is in the other neutral position of the structure. Therefore, due to seismic action the stresses in the building creates the complete reversals and that is too over the small duration of earthquake.

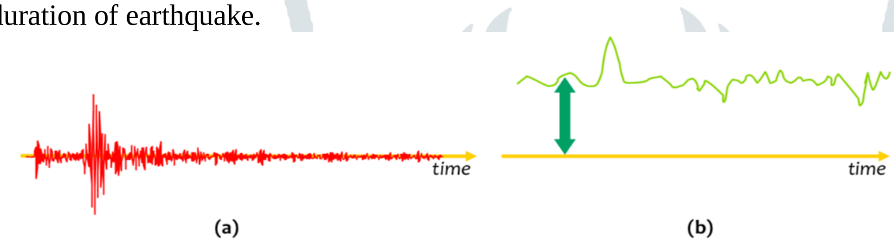


Figure 1.3 Nature of temporal variations of design actions: (a) Earthquake Ground Motion – zero mean, cyclic, and (b) Wind Pressure – non-zero mean, oscillatory.

(source:www.researchgate.net/figure/acceeration-records-and-FFT-plots-for-input-eathquake-records-a-EI-centro-record)

Table 1.1 of various minerals and their P and S wawe velocities and density.

Minerals	P wave velocity(m/s)	S wave velocity (m/s)	Density(g/cm^3)
Soil	300-700	100-300	1.7-2.4
Dry sand	400-1200	100-500	1.5-1.7
Limestone	3500-600	2000-3300	2.4-2.7
Granite	4500-6000	2500-3300	2.5-2.7
Basalt	5000-6000	2800-3400	2.7-3.1

II. LITERATURE REVIEW

Vamvatsikos. D & Cornell C. A [2002] [7], in their study considered the incremental dynamic analysis for the better assessment of the vulnerability and also its various related concerns. IDA is being used for the prediction of the performance and responses of the structure. In the analysis the ground motion I being considered for the evaluation which actually are structural models and intensity of the ground models is highly related to some factors of the scale. Factor responses are generated in the form of the curves with respect to the motionare being generated. Large number of analysis of past of non-linear time is generated by IDA. In the entire IDA there can be 20 different pairs of ground motion and the ground motions are divided into 12 level in scale which generated 20*12=240 different time history analysis which are actually non-linear. The time consumed for the execution of the IDA is quite long because it just provides the responses of the structure starting from the elasticity of the structure to the fall down of the structure. IDA is being used for analyzing the seismic structural capacity of the structure or the building.

M. S. Kircil et al. [(2006] [8], considered the RC frame of the structure in mid-rise for analyzing the fragility of the structure in the city of Istanbul. The sample structure are generated using the seismic design of Turkey, where the 3, 5, and 7 floored buildings are being considered as the sample structure. For analyzing the IDA 12 different ground motions are being considered. The analysis id being done for gathering the data about the yielding and collapse of the building. Different curves of fragility are then drawn using the above capacities. The inter-story drift ratio and the spectral displacement is being maximized which actually considers the immediate occupancy and also collapse prevention conditions. Number of stories and the spectral displacement are inter-related for the better evaluation of the level of performance.

Nikolay & Ryan [2008] [9], the bearing system of friction pendulum is being used for which different lab setups are being used. For the better evaluation of the work the freedom systems are being in different degrees like single for which they are being considered with and also without isolation base. Accelerometer is being used for the better response creation of the free and also for the forced vibrations. Shake table is being utilized for the purpose of testing. The lateral acceleration is being lowered due to the usage of the friction pendulum bearing system and also just because of the variations in the lateral forces. The dynamic response of the isolated base is always better than the other techniques used in the structuring.

Dhawade. S. M (2014) [17], evaluated the seismic performance of the of buildings with base isolation and with fixed base considering the RC frame structure. A building of 15 different storey is being considered for the comparison of the seismic effect of buildings with fixed base and with those having isolated base. ETAB tool is being used for designing a structure of 15 storey with isolated base. HDRB technique is being used for the purpose of isolation which have shown effective results for frame structure over the fixed base structures instead of any other available isolation method.

Tarannum, Y. et al. [2015] [20], presented a review of the various techniques for the analysis of fragility and considered the main features of the techniques and also considered the limitations of the methodologies considered. The work also provides the selection process for the methods of assessment for the assessment of the seismic vulnerability for the complete buildings. On the basis of the review of the various methodologies the author stated that the factors like staircases and lift shift are not considered in any of the techniques for the assessment of the seismic vulnerability

Patel, A. et. al [2016] [21], used ETABS tool for the analysis of the fragility in the case of the long height buildings. X-bracing [28] and V-bracing is being used for the generation of the fragility curves of the structures. The curve of fragility is shown in terms of the PGA of state of limits and considered parameters are like slight, moderate, major and damaged in the case when the distribution is lognormal.

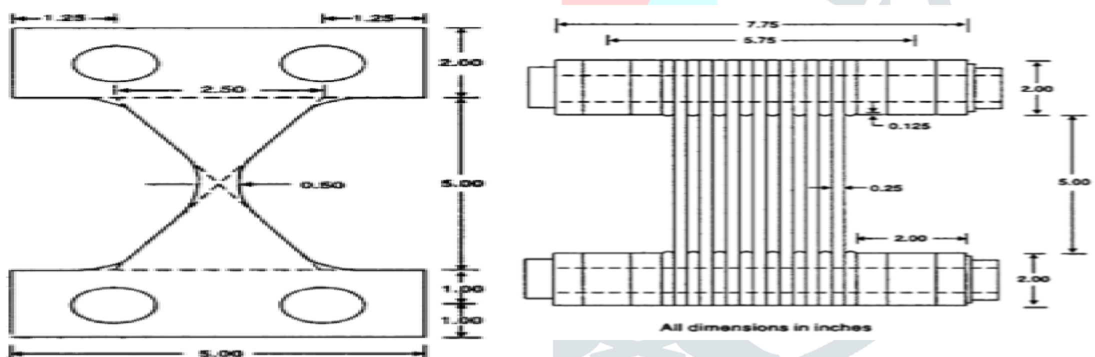


Figure 2.1 ADAS device .

The evaluation of the work represented the reparability of the damage to the building and damage state of the medium soil reduces when the shift is being done from the X-bracing and rises in the case when the shift is from the V-bracing for the different level of the buildings, here in the work the level of the building represents the storey of the building.

One of the best technique for the input energy dissipation for the various structures in the case of the earthquakes is the deformation of the inelastic metals. Mild steel plates are been used by many of these techniques with X-shape just to spread the yielding through the metal sheet. Figure 2.2 represents the X-shaped damper also termed as ADAS (Added Damping and Stiffness) tools. The countries like Japan make use of the devices which are configured with the steel plates, they also includes the bending of the type of the honeycomb.

III. Problem Formulation

3.1 PROBLEM FORMULATION

Today, it is common in structural engineering to use control systems to decrease structures' responses and control the inner and external excitations. Devices may be categorized as passive, active or semi-active. Recently, they have come to be measured successful system devices in growing the confrontation of buildings by restraining the excitation produced by an earthquake or wind, particularly in giant structures and deferral bridges.

J. M. Londono. proposed a methodology to intensification energy dissipations using damper amplification factor. Author focused on inactive fluid dampers, in grouping with a wave amplification instrument and conferring to the author intensification feature is used to upturn the understanding of the impediment and consequently spread its assortment of operation. It is use for ‘‘tune’’ the requisite damping assessment of a sole or numerous dampers.

But, in seismic application, it is not proper to choose passive systems with a constant character to control a system response when there is an inconsistent response content (maximum acceleration and frequency content). In fact, growing the damping proportion in linear damping devices cannot dissipate the internal energy appropriately, and moreover, they transfer the total forces through themselves and behave as a inflexible component. Consequently, the majority quantity of strength will be transported to the connection (where the device is connected to the structure) which can cause damage to the damping device or the assembly member.

So, we propose an approach to decrease the variant response of the functional structure under extreme burden, but also for enhancing system faithfulness and guarantees the human comfort for daily comfort with the use of amplification mechanism same as J. M. Londono, approach and by creating the damping pressure estimated in uniform and consistent to its maximum chances of great amount of p[position without considering the position of the structure in the reply for gaining the maximum power injection in the system.

3.2 PROPOSED METHOD

The power dissipation system is the tool designed and tested to dissipate the huge quantity of the energy. Viscous and hysteretic are two most common energy dissipation system, thus viscoelastic, electro-inductive and by friction damping systems are some more dissipation system. The shape of Viscous dampers devices is of a cylinder that containing a high viscosity liquid, as sketched in Figure 3.1 The doings of this is very easy: in the duration of earthquake, the force which was generated due to of friction in the plates was transferred to the dampers, which makes the fluid in the dumpers to move in the fourth

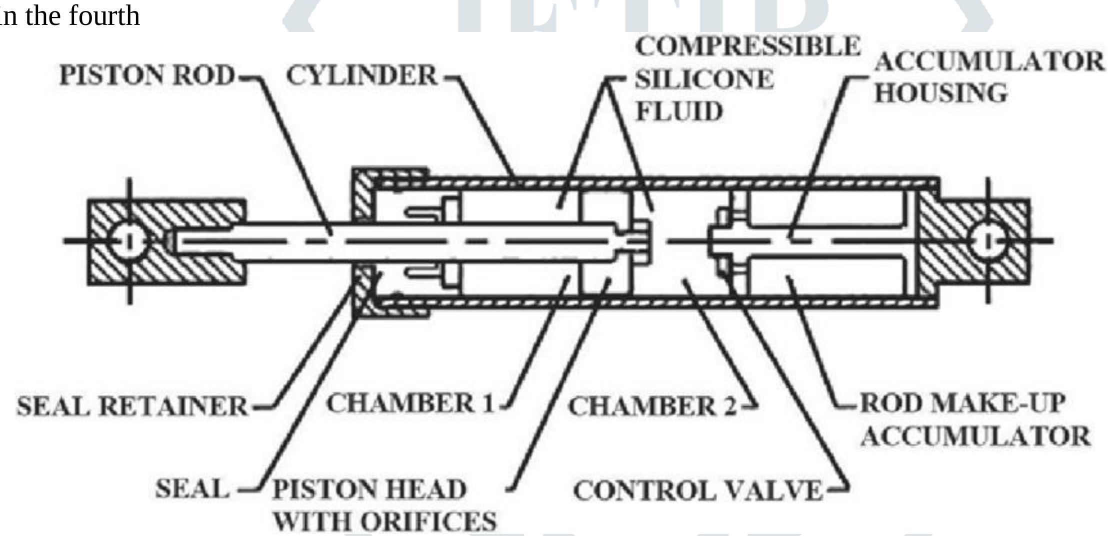


Figure 3.1.Viscous Fluid Damper . (source:sciencedirect.com/topics/engineering/viscous-damper)

direction via the small holes of the dampers. The pace of the seismic energy is wholly dependent on the pace of liquid via the holes of the dampers.

The following expression shows the force emitted by the viscous damper:

$$F = C \times V^{\propto} \qquad \text{Eq. 3.1}$$

Where:

F- force in the damper;

V-relative velocity between the ends of the damper;

C- Damping coefficient depending on the diameter and area of the holes;

α– Characteristic value of the fluid viscosity. The value of can vary between 0.1 and 1.8 (Guerreiro, 2006) [30].

For the maximization of the end results, the value which is equal to 0.1 should be used. The value of C is dependent on the amount of the energy which is dissipated from the flow of liquid.

The main features of viscous dampers are presented:

- High damping constants;
- No requirement of high maintenance (Alga);
- The life span of the building in which the viscous is installed is less than the life of the viscous (Taylor, Devices);

- Foe any type of the application the dampers are highly versatile, regardless of the building's architecture.
- The deformation of the structure and reduction of the stress is allowed by such devices, diminishing the losses in the functional structure and non- structural components in between of the seismic action (Taylor, et al.).
- Involvement reflects that this dissipation system can diminish about half percentage of the accelerations and movement in relation of floors.

3.3.1 Energy Dissipation and Amplification factor

A primary view for the diminishing the structural radiations in the building is to suitable alternate damping tools into the structure. This theory takes the benefits of the structure's own movement to generate relative action within the damping devices. In the reaction, those tools are expected to be generated with full focus on the dissipation of the energy. If the connected movement of the damper can be enlarged for the small structural motion, a large damping power can be attained. Or by using the same damp[er the same damping force is achieved.

Distinctive liquid dampers have two set of seals and a piston in the cylinder. It is seal which prevents the leakage from the cylinder and piston present in that for the purpose of the alignment in the damper. If talks about the performance of the damper the seal is present in the damper for non-linearity and friction effects. One results of the seal is the degree of velocity when the movement of the damper will takes place. This consequence shows the two variant behavior of the damper

1. stabbing when the power is below the motionless friction level and
2. Agliding phase, after the damper is militarized, where energy is efficiently dissolute.

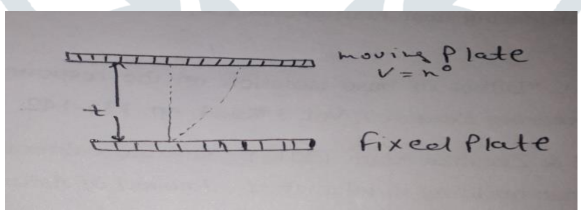
It is important to note that the energy which is not so important is dissipated in the damper at the time of sticking and if there is wide area where this nature occurs the damper motion is utilized.

The main seismic building codes forces the close foundations on the up most allowance to the inter- storey drift of the building when regarded to the earthquake vibrations. For these limits the structural safety is the basic driver, mitigating the losses to non- structural components is also a concerning factor when taking the topic of minor or moderate earthquake. In the truth, in the event of moderate seismic vibrations, frames are estimated to exhibit for the small lateral movements. Is the designing of the damper is for the huge events, the deformation of the small damper does not affect much on the damper, because of the internal friction forces that must to cope prior to move the damper.

However as power is dissipated in the duration of the slipping of the phase other than of the sticking of the phase, one benefit of the strengthening the structure's movement is to utilize a smaller dampers with the less static friction so that the slipping phase occurs at the less movements.

3.3.2 Optimum Parameter of Damper

Focusing on a nonlinear damping coefficient in a damper, a maximum-damping coefficient can be gotten as follows:



Let the force (f) required for maintaining the velocity x^o of the plate is express as:

$$f = \mu A * x^o / t$$

A =Area of plate.
t =thickness of the fluid film.
μ = co-efficient of absolute viscosity of the fim.

The force (f) can also be written as:

$$f = c.x^o$$

co-efficient of damping ; $c = \mu A/t$

Every dissipation in viscous damping: For a vibratory body some amount of energy is dissipated because of damming. The every dissipation can be per cycle .
For viscous damped system the force (f);

$$f = cx^{\circ} = \left(c\frac{dx}{dt}\right)$$
$$x^{\circ} = \left(\frac{dx}{dt}\right)$$

(velocity = rate of change the position of an object wrt time.)
work done = d.w =force * displacement

$$f.dx = \left(c\frac{dx}{dt}\right)\ dx$$

The rate of change of work per cycle;

Energy dissipated $=\Delta E = f.\left(\frac{dx}{dt}\right).dt$

$$\Delta E = \int_0^{2\pi/\omega} c\left(\frac{dx}{dt}.\frac{dx}{dt}\right)\ dt \qquad 3.2$$

Let us assume the simple harmonic motion of the type;

x = A sinωt

differentiation wrt (t) and squaring both sides ;

$$\left(\frac{dx}{dt}\right)^2 = A^2.\omega^2.\cos^2\omega t \qquad 3.3$$

Equ. 3.1 can be written as;

$$\Delta E = \int_0^{2\pi/\omega} c.\omega\text{^}2.A\text{^}2\ (\cos\text{^}2\omega t)\ dt$$

$$\Delta E = \int_0^{2\pi/\omega} c.\omega\text{^}2.A^2(1+\cos\omega t/2)\ dt$$

Hence ; $\Delta E = \pi\omega c A^2$

it can be resulted that damping of the coefficient variations with the time and its value to diminish to hold the damping force on in the area where the internal pressure is at a least level while the value of the energy dissipation is optimum. In the opposite way, to protect diminish in the value of energy dissipation, the damping constant can be enhanced to get the optimum benefit possible for the damping in the framework. The behaviour of the damping tool is unavoidably used to restrains and the damping constant hence required to guarantees the lower and the upper limits as the given below:

$$C_{min} < C(t) < C_{max}$$

The maximum features of this system can be fixed by the LQR regulation algorithm. In this study, the performance that are considered for the regulating system. The structure must have the minimum movement in the point of interest. A maximization of the scheme is required to be grown to minimise the internal pressure of the regulating system. The maximum damping constants may be taken from the Eq.3.2 focusing the damping force is identical to the active regulation force.

Table 3.1 Comparison between seismic wawe of P,S and L wawe.

PHENOMINA	P-WAWE	S-WAWE	L-WAWE
Speed	8 km/s	4 km/s	1.5 km/h
Path	Solid, liquid and gas	Solid and liquid	Only solid
Travel form	Straight	Straight	Zig –Zag

The maximum kinetic energy of the system will be;

$E = ½\ m\ x^{o2}{}_{max}$

From equ. 3.2;

$E = ½\ m\omega^2A^2$

The ratio of ΔE and E is known as the specific damping capacity of the system (const. equ.)

Specific damping capacity = ΔE/E

$C\pi\omega^2A^2/\ ½\ m\omega^2A^2$

$2C\pi/m\omega$

This equation is verify useful in the design of vibratory instruments . The damping material are related by their daming capacity.

IV. RESULTS AND DISCUSSION

This chapter describes the analysis of results that are produced by the proposed approach of Energy Dissipation in Structures. We consider few parameters, Displacement, Variable damping coefficient etc. to calculate or estimate the accuracy of proposed work.

4.1 Analysis Method

It should be performed nonlinear dynamics analysis, to validate the solution and the method under study. The analysis of the studied situations always considers that the building's structure

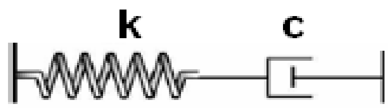


Figure 4.1 Viscous Damper

remains in the linear regime. The viscous dampers are modeled as a Londono' work ,Fig.4.1, which is a nonlinear damper in series with a nonlinear spring (CSI).

The design parameters for this model of viscous dampers are: K (spring stiffness), C (damping coefficient).

4.2 Structure Description

It is chosen a three-story structure to test the effects of the viscous dampers,

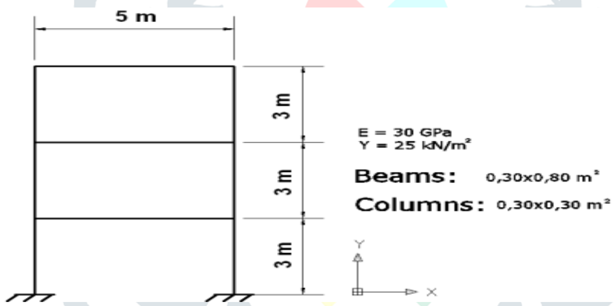


Figure 4.2 Three Story Structure to test effect of viscous damper

4.3 Damper Design

The viscous dampers were placed diagonally between floors, Fig. 4.3.

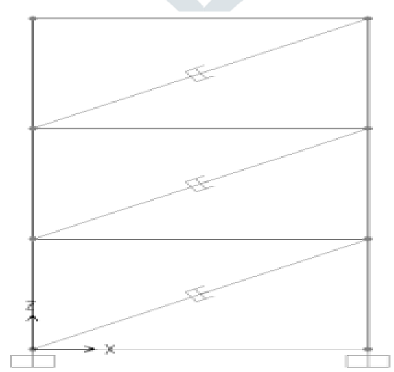


Figure 4.3 Placement of Dampers

It was necessary to define a satisfactory level of stresses and displacements reduction, because in theory for a more sophisticated damper, better results are obtained. So the goal of this study is to reduce 50% the values of maximum relative displacements between floors and base shear force of structure. In the design of these devices, the parameters K, α and C, must be defined. For a better optimization of the results, it was chosen an α parameter of 0.1. The value of K, corresponding to the spring stiffness must be a high value, however, this value should not be too high, or it will cause convergence numerical problems. In this case, a value of K=1.000.000, was adopted.

4.4 Expected Result

With this optimization, it is intended to determine which values provide better results, and the influence of these parameters on the performance of the viscous dampers in the structure in study are interpreted . The results of this analysis (displacement and force) are shown in Fig. 4.4

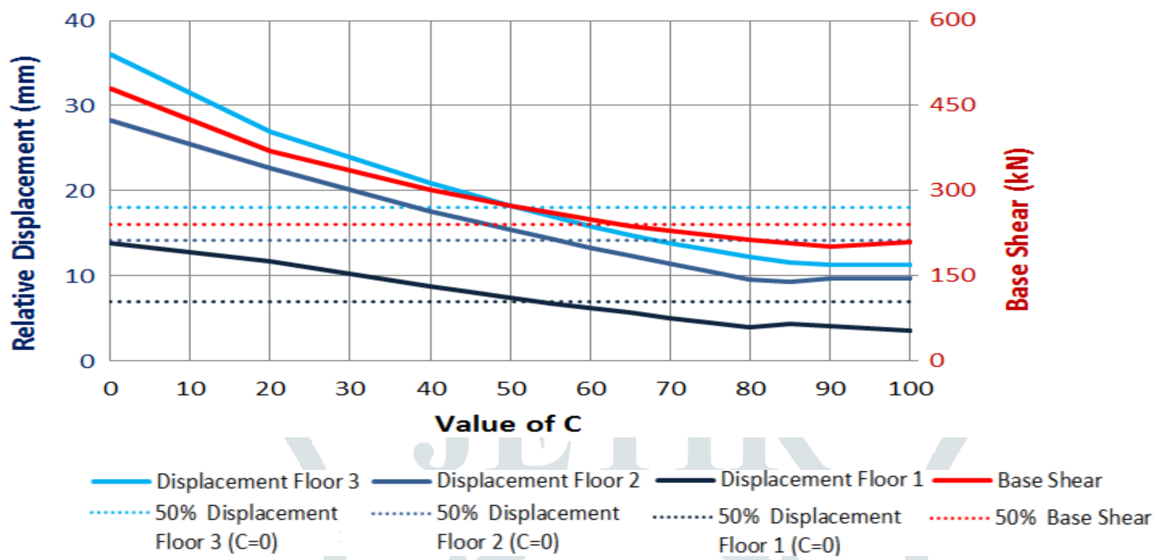


Figure 4.4 Maximum relative displacement of the three floors and base shear force of structure according to the value of C used in the dampers.

Using a fluid viscous damper with a variable damping coefficient from previous equation Listed in chapter 3, it is expected that the damping performance become more uniform and therefore can increase energy dissipation in the system when comparing to the performance of a system with a linear damping coefficient. To compare the results of these damping systems (a Linear, a Non-linear, an Active system), a single degree oscillator is considered and analyzed in a time-history analysis program. The results are compared between the three same structures (oscillator with same damping and stiffness property) with different damping systems. One is isolated by the active control system, the other is isolated by the linear dampers (with constant damping coefficient) and the last one is isolated by the nonlinear dampers (with variable damping coefficient).

Obviously, active system performance is expected to be the most optimum and according to the LQR algorithm, the active system can control the structure's responses with the minimum damping force in the system. Therefore, in this comparison, the maximum damping force is the limit for all cases and should not be exceeded. Therefore, the maximum possible damping force for all damping system is the same.

Evaluation and comparison of how structure responses are controlled by an active control system versus a linear or non- linear system. According to the damped energy plot in Fig. 4.5, the energy loss, which is calculated by multiplying damping force to the displacement vector, is greater in non-linear passive control system than other systems. Since the value of maximum damping force in all three cases (i.e. active control, passive control with linear behaviour and passive with non-linear behaviour) were equal, it can be concluded that the only reason for having more energy loss is the non-linearity characterization of the damper.

For this type of structures, it was proved that the use of viscous dampers ensures an effective displacements and base shear force control, generally, achieving reductions between 60% to 90%. This study also demonstrated that the introduction of energy dissipation in buildings results in a greater homogeneity of the relative displacements in height, in order to get a more

In order to optimize the solution, by maximizing the seismic performance of the structure, it was concluded that the distribution of energy dissipation with optimum parameters and the building should be in accordance to the evolution of displacements in height. More powerful dampers should be condensed with amplification factor and where the displacements are higher, reducing at the same time, the displacements and the base shear force.

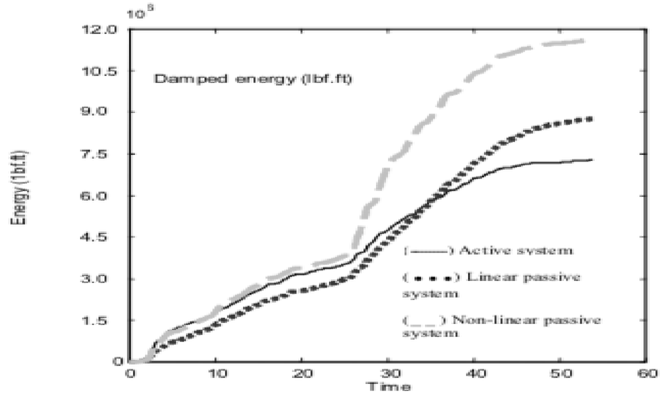


Figure 4.5 Maximum relative displacement of the three floors and base shear force of structure according to the value of C used in the dampers

V. CONCLUSIONS & FUTURE DIRECTION

5.1. CONCLUSION

In the situation of the earthquakes, dynamic motions can be seen in the building. This due to of the building which is comparative to inertia force that work in the opposite direction to the acceleration of the earthquake excitations. These inertia forces, known as seismic loads, are generally deals with assuming forces not internal to the building.

The waves of the energy which travels through the Earth's layers are known by the name as Seismic, and are the end results of the earthquake, volcanic eruptions, magma movement, large landslides and large man-made blasts that results the low- frequency of acoustic energy. So many other natural and anthropogenic originates the low- amplitude waves naturally related to as ambient vibrations. These earthquakes creates variant kinds of the waves with the variant velocities; when the hypo-center reaching seismic observations, their variant travel times assists the researchers to trace the source.

In this work a new technique is being proposed ***"Control Seismic load using Energy Dissipation in Structures"***. Various magnification causes, and its measurable parameters are used in this technique to attain the objectives and fulfill the recognized requirements. The energy indulgence system are tools specially made and tested to disperse huge quantities of the energy. The most usual energy disperse system are the viscous ones (power relative to the speed of distortion) and the hysteretic (power relative to movement), thus there are also the viscoelastic, electro-inductive and by friction damping systems. Viscous discouragements strategies contain of a cylinder which contains the high viscosity of the liquid.

In order to optimize the solution, by maximizing the seismic performance of the structure, it was concluded that the distribution of energy dissipation with optimum parameters and the building should be in accordance to the evolution of displacements in height. More powerful dampers should be condensed with amplification factor and where the displacements are higher, reducing at the same time, the displacements and the base shear force.

5.2. FUTURE DIRECTION

In the enhancement in the field of structural engineering considers many of the important factors like enhancement in the performance of the structure, cost of the construction which is needed to be considered at the time of the design of the structure and also the techniques just considers some of the long times effects on the structure. For the better and wider results continuous and improved efforts are needed to have the techniques that can help in making the structure resistive to the natural calamities like earthquakes. The work needed to be evaluated analytically and also experimentally to have its use in the real time application or on the field or so that its accessibility can be made realistic. Many of the single components of the structure are combined to have better structural system for which some new techniques and methods are needed to be integrated for the better impact of these complex systems. The defined methods are needed to be analyzed experimentally and also analytically for the verification of the work in the real time situations, the verification process considers the performance evaluation, ability to hold for long term and also its impact over the structural systems.

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