

Review of comparative study on seismic behavior of multi-storied buildings using viscous damper and visco-elastic damper

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Abstract –

This examination researches the seismic exhibition of structures with liquid fluid damping frameworks planned as per the methods of ASCE/SEI 7-16. The examination looks at the impact of the accompanying plan boundaries: (1) required quality of the support damper-association framework; (2) base shear power for the structure of the casing selective of the damping framework; (3) measure of damping; (4) damper uprooting limit; and (5) sort of damping including utilization of fluidic self-focusing gadgets. The appraisal of execution depends on the figuring of probabilities of breakdown and of surpassing the particular leftover floats of 0.2, 0.5, 1.0, and 2.0% of story stature for different seismic powers up to the greatest thought about quake and over a lifetime of 50 years for a specific site. The investigation confirms that the most powerful boundaries for diminishing the danger of breakdown and of lessening the likelihood of surpassing the significant leftover story-float proportion cutoff points of 0.5 and 1% are the base shear power for the plan, the quality of the support damper-association framework, and the measure of damping.

1. INTRODUCTION

The thick liquid dampers (VFD) are the more applied instruments for controlling responses of the structure made. These dampers are applied on different premise n new advancement as to decrease fundamental responses to the seismic powers. Despite the way that over the progressing years a decent expense have been paid for the right information on intensity of a seismic quake assessment establishments of the world to decrease hurt, the developing need investigation focuses on the impact came about due to the tremor is perceived in the laboratorial scales. Throughout the latest fifty years, the seismic quakes are organized into two social affairs of close field shakes and far-field quakes reliant on the division of the spot of recording the tremor from the issue. At that point, this definition was adjusted and various factors similarly affected this request. In the continuous years, the assessment considers ground movement.

In latest couple of years, various central enhancements in seismic codes are turned up. Generally extraordinary of the adjustment in the seismic arrangement region get from more important awareness of genuine powerless structures shows in contemporary quakes. On account of the reestablished data on the current structures direct, retrofit of structures is a focal endeavor in diminishing seismic risk. New techniques for making sure about structures against seismic quake have been made with the purpose of improving their capacity. Seismic division and essentialness dissipating are commonly seen as incredible security techniques for showing up at the introduction objections of current codes. In any case, various codes fuse plan specifics for seismically limited structures, while there is still need of improved rules for imperativeness dispersing protective systems.

2. LITERATURE REVIEW

1) Ganesh P Gadakh¹, Rajashekhar S. Talikoti²

In the paper vitality dissemination gadgets for dispersing tremor vitality should be concentrated inside and out from see purpose of their effectiveness in opposing seismic tremor powers. In this paper the exhibition of thick and viscoelastic dampers are concentrated in detail. The seismic exhibitions of these dampers are contrasted and typical exposed casing building. Nonlinear modular time history examination utilizing Elcentro time history information was performed and boundaries, for example, base shear, relocation time history at rooftop level, modular timespan and greatest powers in external and internal section are looked at and introduced. The demonstrating and examination of building is finished utilizing SAP investigation bundle. The gooey and viscoelastic dampers are displayed by utilizing nonlinear connection component having property type dampers. The viscoelastic dampers are demonstrated according to Maxwell model of viscoelasticity. The properties of thick dampers are determined from shear stockpiling modulus and shear misfortune modulus. The outcomes got from examination demonstrate effective execution of thick damper for opposition against most extreme powers and command over relocation and base shear.

2) Lavanya K R¹, Dr. K. Manjunatha²

This exposition work is worried about the similar examination on impacts of Fluid gooey and Viscoelastic dampers in RC building. As indicated by IS 1893 (section 1): 2002, codal arrangements the structures are examined by Equivalent static investigation and Response range strategy. The displaying and investigation is

finished with SAP 2000 programming and the outcomes that is, seismic boundaries, for example, Time period, Base shear, Lateral removal and Inter storey float are organized and afterward near investigation of structures with and without dampers has done.

3) **Benita Merlin Isabella. K*, Dr. Hemalatha. G+**

This paper presents an exhibition examination of different latent dampers, evaluating viability of 6 storey RCC Benchmark structure under controlled and uncontrolled condition. Frameworks of basic control considered are Visco-flexible Damper, Metallic Friction Damper and Viscous Fluid Damper. A multi-storey Benchmark working with 6 stories have been displayed utilizing FEMM Software bundle SAP2000, Nonlinear Time History Analysis was done for three seismic tremor ground movement information to be specific Elcentro 1940, Imperial Valley and Northridge. The reaction of the Benchmark structure was concentrated as uprooting, inter storied float and base shear. Goopy Fluid Damper and Friction Damper shows proficient damping execution when contrasted with other uninvolved vitality dissemination frameworks.

4) **SU MYAT AYE, DR. KYAW MOE AUNG**

This paper presents near examination on seismic reaction of fifteen-storey strengthened solid structure utilizing goopy dampers and viscoelastic dampers. The proposed assembling is situated in Mandalay, seismic zone 4. It is a L-molded structure and its inhabitation is private. Every basic part are structured by ACI 318-99. Burden thought depends on UBC-97. The edge kind of proposed fabricating utilized is the exceptional RC second opposing edge. In this investigation, reaction range examination strategy is utilized for dynamic investigation. The investigation and plan of structure is completed by utilizing ETABS v 9.7.1 programming. Tremors are one of the significant normal risks on the planet. In this investigation, thick dampers and viscoelastic dampers are utilized to control seismic reaction of the proposed fabricating. The technician properties of goopy damper utilized in this investigation are $C_d=320(kN/(mm/s)\alpha)$ and solidness $K_d=224(kN/mm)$. The specialist properties of viscoelastic damper utilized in this investigation are $C_d=12(kN/(mm/s))$ and firmness $K_d=57(kN/mm)$. The storey floats, storey shears, storey minutes, point removals and storey increasing velocities are looked at.

5) **Rakesh Patwa1, Dr. SavitaMaru**

This current paper dependent on the aloof vitality scattering gadgets. These gadgets are controlled the movement of structure by setting gadgets of changing mass and damping or both. This present on execution of to be specific two kinds of damper (tuned mass damper and viscous liquid damper) notwithstanding innate damping of R.C. outline building. The 16 storey unsymmetrical structure modal without any damper with TMD and with VFD are investigated by time history strategy under rudraprayag (2005) time history data. This work is considered to do the viability of TMD and VFD which are intended for same damping esteem. The result of model frequencies, bury storey float, dynamic reaction like increasing speed, speed, dislodging and base shear will be compared of three model. It finished up the reactions of building is likewise lessens by utilizing VFD of Same Damping coefficient as TMD, and Building without Dampers.

6) **M. S. Landge, Prof. P. K. Joshi**

This examination .manages determination of reasonable kind of damper which will be More impervious to seismic tremor for the chose building. The paper work is worried about the relative investigation of different kinds of dampers utilized for multi-storey RCC building.

Reaction range technique is utilized to break down seismic conduct of g+7 storey working with and without dampers. In response spectrum strategy, quake load is applied in both x and y course. For the examination reason etabs 2015 programming is utilized by considering seismic zone iv according to is 1893:2002(part 1) code. Consequences of these examinations are talked about regarding various parameters, for example, greatest total relocation, outright speeding up, supreme speed, storey shear, storey float. The comparison of these different boundaries is finished. The structure is broke down with and without different kinds of dampers. Results of these investigations are talked about as far as different boundaries, for example, most extreme supreme removal, total acceleration, storey shear, storey float. The correlation of these different boundaries is finished. From these correlation it is closed that maximum supreme removal, total speeding up, storey shear, storey float esteems are more if there should be an occurrence of RC building without damper when contrasted with rc working with dampers. Maximum total relocation, total increasing speed, storey shear, storey float esteems are more in the event of RC building without damper when contrasted with RC working with dampers.

7) **K. Sudheerkumar, Y.Vinod**

This examination manages the presentation assessment of different sort of aloof control gadgets for the chose RC outline structure. Time history investigation is completed on a G+9 storey RC confined structure with and without dampers by utilizing sap 2000. Aftereffect of the examination uncovered that most extreme outright relocation, storey shear, storey float esteems are more in the event of RC encircled structure without damper when contrasted with RC surrounded structure with dampers.

8) **Neha M. Mevada¹, Snehal V. Mevada and Sumant B. Patel**

In this paper, the seismic reaction of two nearby single storey structures of various major frequencies associated with different kinds of dampers under various tremor excitations is examined. A plan of the conditions of movement for model of structures associated with dampers is introduced. The seismic reaction of the framework is gotten by numerically settling the conditions of movement utilizing state-space technique. The viability of different kinds of dampers, viz., non-direct viscos and viscoelastic dampers regarding the decrease of basic reactions (i.e., removals and increasing velocities) of associated nearby structures is researched. A parametric report is additionally led to examine the ideal damping coefficient of the dampers for nearby single storey associated structures. Results show that associating the contiguous single storey structures of various key frequencies by these dampers can adequately decrease the quake incited reactions of either fabricating. There exist ideal damper coefficients for least quake reaction of the structures.

9) **X.L. Lu, K. Ding, D.G. Weng, K. Kasai & A. Wada**

Viscous dampers (VD), steel dampers (SD) and viscoelastic dampers (VED) are pervasive vitality dissemination gadgets for seismic applications in China, particularly after Wenchuan tremor. To research the seismic impact of these three sorts of dampers, a 8-storey fortified cement (RC) outline structure is set up dependent on a harmed RC building experiencing Wenchuan quake. The structure retrofitting plan technique with dampers is presented in short. The boundaries of the three sorts of dampers are chosen depending on the prerequisite that these dampers have identical greatest damping powers under moderate seismic tremor. At that point, the seismic exhibition of the 8-storey RC outline included with thick dampers, viscoelastic dampers and steel dampers are explored separately.

3. **METHODOLOGY**

TIME HISTORY ANALYSIS:

ETABS Software handles the underlying states of a period work diversely for direct and nonlinear time-history load cases.

A depiction is as per the following:

1. Linear cases consistently start from zero, thusly the relating time work should likewise begin from zero.
2. Nonlinear cases may either begin from zero or may proceed from a past case. When beginning from zero, the time work is just characterized to begin with a zero worth. At the point when investigation proceeds from a past case, it is accepted that the time work additionally proceeds with comparative with its beginning worth. A long record might be broken into numerous successive investigations which utilize a solitary capacity with appearance times. This forestalls the need to make different altered capacities.

Time-history traces

Time-history follows might be shown for a chose joint through Display > Show Plot Functions. Select the joint from List of Functions, select Define Plot Functions, select the joint once more, and afterward select Modify/Show Plot Function. Select the reaction boundary from Vector Type, and the DOF from Component. Select OK > OK to leave these structures. Select the joint once more, and afterward select Add. Since the Vertical Function is indicated, select the Horizontal Plot Function, at that point spare the Named Set whenever wanted. Select Display to introduce the plot.

4. **CONCLUSION**

While studying these I concluded providing dampers will make it more resistant to earthquake. We will also observe the behaviour of building under base shear, storey displacement.

5. REFERENCE

1. Constantinou. M. C., Soong, T. T., and Dargush, G. F. (1998). "Passive energy dissipation systems for structural design and retrofit", Monograph No. 1, Multidisciplinary Center for Earthquake Engineering Research, Buffalo, New York.
2. Chang, K. C., Soong, T. T., Lai, M. L., and Nielsen, E. J. _1993_. "Development of a design procedure for structures with added viscoelastic
3. Trevor e Kelly and t k dutta "optional use of VE dampers in frames for seismic forece" ,ASCE J.Strutural engineering
4. T. Soong and G. F, Dargush John Wiley Sons Chichester, Passive energy dissipation in Structural engineering, Volume6, Issue 1 June 1999.
5. Trever. E. Kelly, S.E, "In Structure damping and energy Dissipation guidelines" Volume 4, July 2001.
6. Hanson RD, Soong TT, Seismic design with supplemental energy dissipation devices. Monograph No. 8, EERI Oakland, 2001.
7. M.D. Symans and M.C.Contstaniou, " Passive fluid viscous damping system for seismic energy dissipation," ISET Journal of Earthquake technology.,Vol.35,pp.185-206, Dec 1998.
8. K.C. Chang , Y.Y. Lin and M, "Seismic Analysis and Design of Stucture with Viscoelastic Dampers," ISET Journal of Earthquake Technology., Vol.35,pp.143-166, Dec 1998.
9. T.T. Soong and B.F. Spencer, "Supplemental energy dissipation: state-of-the-art and state-of-the practice," Engineering Structures., Vol.24, pp.243-259,2002.
10. Robert J. MCNAMARA and Douglas P. Taylor, "Fluid viscous dampers for high-rise buildings," – The structural design of tall and special buildings, Vol.12, pp.145-154,2003.
11. Lyan-Ywan Lu, "Predictive control of seismic structures with semi-active friction dampers," –Earthquake Engineering Structures-Dynamics, Vol.33,pp.647-668,2004.