



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 5, May 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118

9940 572 462

6381 907 438

ijirset@gmail.com

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Building stability againce Earth Quake and Wind Disturbance: A Review

Sayma Aslam Jamadar, Rajiya Rafik Mulla, Anjali Ananda Naik, Mehak Samiullah Makandar,
Bhagyashree Balaso Mane, Prof. A.V.Hajare

Diploma Student, Department of Civil Engineering, Yashwantrao Chavan Polytechnic Ichalkaranji, India

Diploma Student, Department of Civil Engineering, Yashwantrao Chavan Polytechnic Ichalkaranji, India

Diploma Student, Department of Civil Engineering, Yashwantrao Chavan Polytechnic Ichalkaranji, India

Diploma Student, Department of Civil Engineering, Yashwantrao Chavan Polytechnic Ichalkaranji, India

Diploma Student, Department of Civil Engineering, Yashwantrao Chavan Polytechnic Ichalkaranji, India

Department of Civil Engineering, Yashwantrao Chavan Polytechnic Ichalkaranji, India

ABSTRACT: In recent years, considerable attentions have been paid to research for the development of structural control devices, particularly focusing on the mitigation of wind and seismic's effects. The use of water tanks at roof as resistant solutions, which are known as Tuned Liquid Dampers (TLD), for high-rise buildings is considered in this paper. In the literature, TLD has shown significant advantages and can be one of excellent methods to control highrise building's vibration. Liquid storage tank is designed to achieve its natural frequency same as that of the building. As a result, the resonant phenomenon will occur and contribute to the building's balance.

Besides using TLD to analyse the seismic resistance for high-rise buildings, this paper is also considered the interaction between the liquid and tank wall for with/without using water tank at roof as seismic resistance devices. Results showed that the maximum displacements at the top of buildings can be decreased from 50% to 80% and internal stresses are also reduced meaningfully.

KEYWORDS: Tuned liquid damper(TLD), water tank

I. INTRODUCTION

Vibration in buildings can be caused by many different external sources, including industrial, construction and transportation activities. The vibration may be continuous, impulsive or intermittent. Vibration in buildings also occur from internal sources, such as a road development forming part of the building or mechanical vibration sources in buildings. Vibration and its associated effects are usually classified as continuous, impulsive or intermittent as follows. Continuous vibration continues uninterrupted for a declined period, usually throughout day time or night time. Impulsive vibration will build up rapidly to a peak followed by damped decay that may or may not involve several cycles of a vibration depending on frequency and damping. Intermittent vibration can be defined as interrupted period of continuous (For ex- a drill) or repeated periods of impulsive vibration (For ex- a pile driver) or continuous vibration that varies significantly in magnitude. Modern tall buildings have become relatively light and flexible with the plentiful application of high strength materials in civil engineering making the structure collapse early or exceed the comport limitation at the action of dynamic loads such as seismic and wind. The structure vibration control in the buildings can be a successful method of mitigating the effects of these dynamic responses. Response control technologies are also available to improve performance under strong wind excitations. The technologies have been developed to improve the inhabitants comfort during strong wind.

II. RELATED WORK

Literature survey is the most important step in any kind of research. Before start developing we need to study the previous papers of our domain which we are working and on the basis of study we can predict or generate the drawback and start working with the reference of previous papers



LITERATURE REVIEW

- **Sigurdur Gardarsson et al. (2001)** ^[2], Investigated the performance of asloped-bottom TLD with an angle of 30° to the tank base. It is shown that despite the hardening spring behavior of a rectangular TLD, the sloped-bottom one behaves as a softening spring. Also, it is observed that more liquid mass participates in sloshing force in the sloped bottom case leading to more energy dissipation.
- **Livaoglu. R. And Dogangun A. (2006)** studied the effects of the incorporation of the bottom on the seismic behavior of the raised system of a fluid tank with a structural structure that supports the reservoir containing the fluid. Six different soil types defined in the seismic codes were considered.
- **IITK-GSDMA Guidelines (For Seismic Design of Liquid Storage Tanks)** says that, most elevated tanks are never filled completely with liquid. Hence a two mass idealization of the tank is more appropriate as compared to a one mass idealization, which was used in IS 1893: 1984. Two mass models for elevated tank were proposed by Houser (1963) and are being commonly used in most of the international codes.
- **Pavan S. Ekbote and Dr. Jagdish G. Kori:** During the earthquake, the elevated water tanks suffered severe damage or collapsed. This could be due to the lack of knowledge of the behavior of the water tank support system, once again, to the dynamic action and also to the inadequate geometric selection of tank staging models. Because of the interactions of the fluid structure, the seismic behavior of elevated water tanks has the characteristics of complex phenomena. The main objective of this study is to understand the behavior of the support system (or staging) that is more effective with different methods of response spectrum with the software SAP 2000. In this work several support systems such as radial reinforcement have been studied and transversal.

III. METHODOLOGY

For this dissertation work it is proposed to carry out the work in the following phases.

Phase I: Collection of information through literature review and or preliminary study on site.

Phase II: Collection of data through questionnaires’ devised in the same regards.

Phase III: Finding over engineering in different projects by comparing data collected

Phase IV: Develop a prototype model to assess the over engineering (OE) in a construction project.

Phase V: Validation of the model for selected case study.

| MONTH | Phase I | Phase II | Phase III | Phase IV | Phase V |
|-----------|---------|----------|-----------|----------|---------|
| September | | | | | |
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IV. CONCLUSION

- Behavior of TLD with different water tank depths is more efficient to reduce structural vibration.
- In comparison, the structure without tank model and with tank model, the storey drift is more in structure with tank than structure without tank. It can be observed from the analysis.

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