بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــســـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

Mansoura University
Faculty of Engineering
Industrial Prod. Engineering Dept.

Effect of Earth Vibrations on Vibration of Structures

M. Sc. Thesis

By

Eng. Salah Ahmed Mohamed El-Shourbagy
B.Sc. Production Engineering

A M. Sc. Thesis Submitted In Partial Fulfillment of Requirements for

The Degree of Master of Science

In
Production Engineering

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بسم الله الرحمن الرحيم

صبغة الله ومن أحسن من الله

صبغة ونحن له عابدون.

Supervisors

Thesis Title :-

Effect of Earth Vibrations on Vibration of Structures

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CONTENTS

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SUMMARY

Research in the field of earthquake phenomenon is currently gaining an increasing interest to obtain a full understanding of its aspects, and develop a structural design code for minimizing earthquakes risks. The risks of earthquake can have a wide spectrum of casualties including damage of structures such as dams, nuclear reactors, factories, etc., which result in a great negative social and economical impact on any nation encountering the unfortunate mishap of being hit by an earthquake.

This thesis presents an analysis of the dynamic behavior of structures under the effect of vibrations due to earthquakes. The objectives of the presented research are categorized as follows:

- predicting earthquake excitation "intensity and magnitude".
- suggesting preventive precautions for structures, before facing unexpected casualties of an earthquake.
- developing a technique for reducing the vibration impact of structures due to earthquakes by providing proper isolation of the structure.
- providing computer models of different structures to study the effect of different parameters in controlling structure vibration.

The results showed that the existence of the active mass damper reduced the maximum displacements of the floors significantly. Reductions reaching 70% of the original floor displacements.

The effect of the position of the active mass damper on the displacement reduction is relatively small. The difference in results between the cases where the active mass damper was placed at various levels was found to be relatively small. However, the minimum displacement results were obtained when the active mass damper was placed in the middle floor.

The results of analysis showed that the stiffness and damping coefficients of the active mass damper were significant parameters affecting its efficiency in reducing floor displacements. Increase of the damping coefficient of the damper was found to increase its efficiency and reduce floor displacements while increase of the damper's stiffness was found to have a contrary effect, where floor displacements were increased.

It can therefore be concluded from the study that the active mass damper is highly efficient reducing floor displacements and consequently stresses in the building's structural elements. Based on the findings of this study, the best position for the active mass damper is the top floor because of its efficiency in reducing earthquake effect on the building, and in order not to occupy useful space in the building in addition to the ease of its maintenance. The research pointed out to the importance of studying vibration problems due to earthquake to maintain structural safety and limit the economical loss.

NOMENCLATURE

Symbol	*Units*	*Definition*
E	Ergs	The Force of Vibration according to Richter gauge.
M		Richter Gauge Ranges between 0 - 8.9.
P		Primary Wave of Earthquake.
S		Secondary Wave of Earthquake.
g	m/sec^2	Acceleration due to gravity
X_n		Relative displacement
P_b		Probability
X		X-axis
Y		Y-axis
M_X		Bending moment about y-axis
M_y		Bending moment about x-axis
L		Longitudinal direction
U_d		Downstream
u	m	Lateral displacement of foundation
K_o	N./m	Stiffness of foundation in the lateral direction
$\bar{k}_o$	N.m/rad	Stiffness of foundation in the rotation direction
K_1	N./m	Stiffness of first floor in the lateral direction
$\bar{k}_1$	N.m/rad	Stiffness of first floor in the rotation direction
K_n	N./m	Stiffness of the floor n in the lateral direction
$\bar{k}_n$	N.m/rad	Stiffness of the floor n in the rotation direction
C_o	$N.m^{-1}.sec$	Damping of foundation in the lateral direction
$\bar{c}_o$	$N.m^{-1}.sec./rad$	Damping of foundation in the rotation direction
C_1	$N..m^{-1}.sec$	Damping of first floor in the lateral direction
$\bar{c}_1$	$N.m^{-1}.sec./rad$	Damping of first floor in the rotation direction
C_2	$N..m^{-1}.sec$	Damping of second floor
h	m.	Height of floor