



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





شبكة المعلومات الجامعية



شبكة المعلومات الجامعية

التوثيق الالكتروني والميكرو فيلم

جامعة عين شمس

التوثيق الالكتروني والميكرو فيلم

قسم

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بالرسالة صفحات
لم ترد بالأصل



*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**

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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

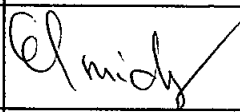

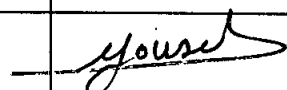
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***Effect of Earth Vibrations on Vibration
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CONTENTS

	Page
ACKNOWLEDGMENT	I
SUMMARY	II
NOMENCLATURE	IV
LIST OF FIGURES.....	VI
LIST OF TABLES.....	XI
CHAPTER I. INTRODUCTION	1
1.1. <i>Vibration in industrial structures</i>	2
1.2. <i>The phenomenon of earthquake.....</i>	5
1.3. <i>Scope of the present work.....</i>	9
1.4. <i>Organization of thesis.....</i>	10
CHAPTER II. LITERATURE REVIEW	12
2.1. <i>The nature of earthquake.....</i>	12
2.2. <i>Effect of isolator on structure under earthquake response</i>	18
CHAPTER III. MATHEMATICAL ANALYSIS	26
3-1. <i>Theoretical study</i>	26
3-2. <i>Ground motion</i>	27
3-3. <i>Mathematical model</i>	29
3-3.1 <i>Case study (1)</i>	29
3-3-2. <i>Case study (2)</i>	33
3-3-3. <i>General Mathematical model.....</i>	37
3-4. <i>Types and location of damper and base isolation.....</i>	42
3-4-1. <i>An active mass damper</i>	47
3-5. <i>Computer program.....</i>	48
CHAPTER IV. RESULTS AND DISCUSSIONS	64
4-1- <i>Simulation Results of The First Structure Configuration</i>	65

4-1-1. A shape of displacement of five floors in the time domain	65
4-1-2. The effect of damping factor on the relationship between frequency and the structure response.....	65
4-2. Simulation Results of The Second Structure Configuration....	77
4-2-1. A shape of displacement of five floors in the time domain at the lateral direction and angle of whole building.....	77
4-2-2. The effect of damping variation of floors on the displacement of structure	77
4-2-3. The effect of floor stiffness on floor displacement with fixed value of foundation stiffness.....	78
4-3. Simulation Results of The Third Structure Configuration....	83
4-3-1. A shape of displacement and angle values for each floors in the time domain at the lateral direction	83
4-3-2. Effect of floor damping on the structure response	83
4-3-3. Effect of change of foundation damping on the structure response.....	83
4-3-4. The effect of change of foundation damping on the structure response at floors no damping.....	84
4-3-5. Effect of floor stiffness on the structure response.....	84
4-3-6. Effect of foundation stiffness on the structure response	84
4-3-7. Time domain signal of rotation of 13 floor structure of type III configuration	84
4-3-8a. The effect of number of degrees of freedom on the structure response at lateral direction.	85
4-3-8b. The effect of number of degrees of freedom on the structure response at rotation direction	85

4-3-9. <i>The floor height effect on dynamic behavior of model structure.....</i>	86
4-4. <i>Computational Aspects of simulating the three structure types</i>	87
4-5. <i>Comparison between the different positions of an active damper.</i>	88
4-6. <i>Effect of active mass damper on the structure response</i>	89
4-6-1. <i>Effect of damping variation for damper (top floor)....</i>	89
4-6-2. <i>Effect of stiffness variation for damper (top floor)....</i>	89
4-6-3. <i>Effect of mass variation for damper (top floor)....</i>	89
4-6-4. <i>Effect of damping variation for damper (third floor)....</i>	90
4-6-5. <i>Effect of stiffness variation for damper (third floor)....</i>	90
4-6-6. <i>Effect of mass variation for damper (third floor)....</i>	90
4-6-7. <i>Effect of damping variation for damper (foundation)....</i>	91
4-6-8. <i>Effect of stiffness variation for damper (foundation)....</i>	91
4-6-9. <i>Effect of mass variation for damper (foundation)....</i>	91
CHAPTER V. CONCLUSIONS AND FUTURE WORK.....	126
REFERENCES	129
APPENDICES	134
APPENDIX A	135
APPENDIX B	138
APPENDIX C	142
Arabic Summary	

I

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II

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.

III

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.

IV NOMENCLATURE

<i>Symbol</i>	<i>Units</i>	<i>Definition</i>
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 ₀	N./m	Stiffness of foundation in the lateral direction
\bar{k}_0	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 ₀	N.m ⁻¹ .sec	Damping of foundation in the lateral direction
\bar{c}_0	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