



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



SAFAA MAHMOUD



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شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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Ain Shams University

Faculty of Engineering

INVESTIGATION ON COMPATIBILITY TORSION OF CONCRETE FLOOR SLABS

By

PAULA MAGDY SEDKY DAWOUD

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Structural Engineering Dept. South Valley University

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Supervised by

Prof. Dr. AMR ALI ABD EL RAHMAN

Prof. of Concrete Structures, Ain Shams University

Assoc. Prof Dr. OSAMA EL NESR

Associate Prof. of Structural Engineering Dept., Ain Shams University

Dr. AYMAN SAYED ABOUBEAH

Assistant Prof. of Structural Engineering Dept., Ain Shams University

Feb., 2020

Cairo, Egypt

Engineer: PAULA MAGDY SEDKY DAWOUD
Date of Birth: 4/5/ 1992
Nationality: Egyptian
E-mail: bolasedky92@gmail.com
Phone: 01289527809
First Academic Degree: B.Sc. (South Valley 2014)
Degree: Master of Science
Department: Structural Engineering

STATEMENT

This dissertation is submitted to Ain Shams University, Cairo, Egypt, for the degree of Master Science in Civil Engineering (Structural).

No part of this thesis has been submitted for a degree or qualification at any other University or Institution.

Date : / /2020

Name : Paula Magdy Sedky

Signature:

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
STRUCTURAL ENGINEERING DEPARTMENT

Abstract of the MSc thesis submitted by

Eng. Paula Magdy Sedky Dawoud

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OF CONCRETE FLOOR SLABS "**

SUPERVISORS:

Prof. DR. AMR ALI ABD EL RAHMAN

DR. OSAMA EL NESR

DR. AYMAN SAYED MOHAMED ABOUBEAH

ABSTRACT

Many structural elements such as eccentrically loaded bridge girders, curved beam in plan, grids, beam-slab structural system and spandrel beams in buildings are subjected to significant torsional moments. Such members are subjected to twisting about its longitudinal axial, known as torsion, in addition to the shear force and bending moment, hence the external loads act far away from the vertical plane of bending. To design such members, it is essential to recognize whether the torsional moment is required to

maintain equilibrium or compatibility. These two cases are generally referred to as equilibrium torsion or compatibility torsion, respectively. Torsion in determinate structures is always equilibrium torsion, while that in indeterminate structures can be of compatibility torsion which happens in spandrel beams and it will be the matter of this study. Once the spandrel beam cracks in torsion, its torsional stiffness reduces substantially. The reduction causes a significant redistribution of torque to the framing element.

The presented thesis introduces an experimental and analytical study in order to investigate the compatibility torsion of spandrel beams taking into consideration the effect of cracking, torsional reinforcement for main beam (spandrel beam), degree of fixation, and reinforcement ratio. A total of four specimens were tested under concentrated load and the findings were reported, including capacity, serviceability limit states and failure mode. Analysis and prediction of the tested specimens are also presented in the light of recommendations of international codes.

Keywords: Compatibility, Grid slabs, RC, rotation, spandrel, torsion, T-shaped frame, torsional reinforcement.

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TABLE OF CONTENTS

TABLE OF CONTENTS

APPROVAL SHEET.....	i
STATEMENT	ii
ABSTRACT.....	iii
ACKNOWLEDGEMENT.....	v
TABLE OF CONTENTS.....	vi
LIST OF TABLES	xiii
LIST OF FIGURES.....	xiv

CHAPTER (1): INTRODUCTION

1.1 GENERAL.....	1
1.2 OBJECTIVES.....	2
1.3 SCOPE OF WORK.....	3
1.3.1 Experimental Investigation	3
1.4 THESIS LAYOUT.....	4

CHAPTER (2): LITERATURE REVIEW

2.1 GENERAL.....	7
2.2 EQUILBRIUM TORSION AND COMPATIBILITY TORSION.....	8
2.2.1 Equilibrium Torsion.....	8
2.2.2 Compatibility Torsion.....	9
2.3 PRINCIPALE STRESSES DUE TO TORSION.....	11
2.4 THIN WALLED TUBE IN TORSION.....	11
2.5 Compatibility TORSION IN SPANDREL BEAMS.....	13
2.5.1 Moment Redistribution.....	14
2.6 PREVIOUS EXPERIMENTAL INVESTIGATIONS.....	17
2.6.1 Collins and Lampert 1971	17
2.6.2 Hsu and Hwang 1977.....	18

2.6.3 Abdul Mansur and Rangan 1987	19
2.6.4 Mo and Hsu 1991	19
2.6.5 Anis and Abdu Alrazaq 1998.....	20
2.7 DESIGN FOR COMPATIBILITY TORSION IN CODES.....	22
2.7.1 Compatibility Torsion In ACI Code.....	22
2.7.2 Compatibility Torsion In CSA Code.....	23
2.7.3 Compatibility Torsion In EURO Code.....	24
2.7.3.1 Evaluation Of Torsional Momnets In EURO Code.....	24
2.7.4 Compatibility Torsion In ECP Code.....	25
2.7.4.1 Redistribution Of Torsional Moment For Statically Indeterminate Structures	25
2.7.4.2 Reinforced Concrete Section Stiffness In Torsion.....	26

CHAPTER (3): EXPERIMENTAL WORK

3.1 GENERAL	38
3.2 DESCRIPTION OF THE TESTED SPECIMENS.....	38
3.2.1 Specimens	40
3.3 MATERIAL PROPERTIES.....	42
3.3.1 Concrete.....	42
3.3.1.1 Control Specimens.....	42
3.3.2 Reinforcing Steel	43
3.4 CASTING, COMPACTING AND CURING OF TESTED SPECIMENS....	43
3.5 EQUIPMENT AND INSTUMENTATION.....	44
3.6 TEST SETUP AND LOADING SCHEME.....	45
3.7 TEST PROCEDURE.....	45

CHAPTER (4): EXPERIMENTAL RESULTS

4.1 GENERAL.....	60
4.2 BEHAVIOR OF THE TESTED T-SHAPED SPECIMENS.....	61
4.2.1 T-SHAPED SPECIMEN (SP1).....	61

4.2.2 T-SHAPED SPECIMEN (SP2).....	62
4.2.3 T-SHAPED SPECIMEN (SP3).....	63
4.2.4 T-SHAPED SPECIMEN (SP4).....	64
4.3 CRACK PATTERNS, CRACKING LOADS AND FAILURE LOADS.....	65
4.3.1 The First and Second T-shaped Specimens.....	70
4.3.2 The Third and Fourth T-shaped Specimens.....	71
4.4 DEFORMATIONAL BEHAVIOR OF THE SPECIMENS.....	72
4.5 STRAINS OF STEEL REINFORCEMENT.....	74
4.5.1 The First and Second T-shaped Specimens.....	75
4.5.2 The Third and Fourth T-shaped Specimens	75
4.6 REACTION AT ROLLER SUPPORT.....	76
4.6.1 The First and Second T-shaped Specimens.....	76
4.6.2 The Third and Fourth T-shaped Specimens.....	77

CHAPTER (5): ANALYTICAL WORK

5.1 GENERAL.....	111
5.2 ANALYTICAL RESULTS.....	113
5.2.1 Group (G1)- (SP1&SP2) Specimens.....	113
5.2.2 Group (G2)- (SP3&SP4) Specimens.....	113
5.3 COMPARISON BETWEEN EXPERIMENTAL AND ANALYTICAL WORK....	113
5.4 BEHAVIOR OF THE TESTED T- SHAPED SPECIMENS.....	114
5.5 BENDING AND TORSIONAL MOMENTS.....	115
5.6 REACTION AT ROLLER SUPPORT.....	117

CHAPTER (6): CONCLUSIONS

6.1 GENERAL.....	118
6.2 CONCLUSIONS.....	120
6.3 SUGGESTED AREAS FOR FUTURE RESEARCHES.....	123

REFERENCES.....	124
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LIST OF TABLES

LIST OF TABLES

Table

(2-1) Values of K_1 for a rectangular section.....	25
(2-2) Values of factor β to calculate torsional stiffness of sections.....	26
(3-1) Description of the T-shaped test specimens	40
(3-2) Mix properties for the used concrete.....	42
(3-3) Result of The Control Specimen.....	43
(4-1) Experimental Results of Cracking Load, Failure Load.....	86
(5-1) Analytical and Experimental Result of Bending and Torsional Moments For First T-shaped Specimen.....	113
(5-2) Analytical and Experimental Result of Bending and Torsional Moments For Second T-shaped Specimen.....	113
(5-3) Analytical and Experimental Result of Bending and Torsional Moments For Third T-shaped Specimen.....	114
(5-4) Analytical and Experimental Result of Bending and Torsional Moments For Fourth T-shaped Specimen.....	114

LIST OF FIGURES

LIST OF FIGURS

Figure

(2-1) Cantilever Beam Subjected To Equilibrium Torsion.....	27
(2-2) Cantilever Canopy.....	27
(2-3) Box-Girder Bridge.....	28
(2-4) L-Shaped Girder.....	28
(2-5) Compatibility Torsion.....	29
(2-6) Example Of Compatibility Torsion.....	29
(2-7) Shear Stresses Due To Torsion.....	30
(2-8) Principal Stresses.....	30
(2-9) Crack Pattern.....	30
(2-10) Thin-Walled Tube Subjected To Torsion.....	31
(2-11) Space Frame Showing The Test Specimen.....	31
(2-12) Test Specimen Resting On Three Spherical Hinges.....	32
(2-13) Test Specimen At Separating Floor Beam From Spandrel Beam.....	32
(2-14-a) Test Specimen Shows Moment Diagrams From Equilibrium.....	33
(2-14-b) Test Specimen Shows Shear Diagrams From Equilibrium.....	33
(2-14-c) Test Specimen Shows Torque Diagrams From Equilibrium.....	33
(2-15) Hsu and Burton Test Specimen.....	34
(2-16) Testing Of T-Shaped Test Specimen With Four Concentrated Load by Hsu and Burton 1974.....	34
(2-17) Load-Torque Curves For Specimens B1, B2 and B5 by Hsu and Burton 1974....	35
(2-18) Torque- Twist Curves Fpr Specimens B1, B2 and B5 by Hsu and Burton 1974.....	35
(2-19) Test Set-up by Ozerdinc et al 1972.....	36