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التوثيق الالكتروني والميكروفيلم

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Investigation of Short Term Deflection of Reinforced Concrete Flat Slabs

A Thesis submitted in partial fulfillment of the requirements of the degree of Master of Science in Civil Engineering
(Structural Engineering)

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Statement

This dissertation is submitted to Ain Shams University, Faculty of Engineering for the degree of M.Sc. in Civil Engineering.

The work included in this thesis was carried out by the author in the department of Structure Engineering, Faculty of Engineering, Ain Shams University, from 2016 to 2021.

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

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others.

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Abstract

This research is dedicated to correct the short term deflection of concrete flat slab calculated based on Branson equation used in both ACI 318 code and ECB-207 code. Due to assumed linear material behavior, sudden reduction of effective inertia after cracking and 1D action of this equation (was conducted after studies in simply supported beams), calculated deflection from this equation is overestimated form actual behavior, so a correction factor for deflection calculated from Branson equation is the main objective for this research.

After verification of ABAQUS Software as FEM simulation of flat slab behavior, a parametric study is conducted to make charts for the correction factor of deflection calculated using Branson equation. Assuming that Fc'= 30 MPa And Fy=400 MPa , a parametric study is made on total of 75 square simply supported flat slab and 75 one way simply supported flat slab. Those slabs are modeled using both CSI SAFE (using ACI-318 Cracking Criteria) and ABAQUS (Using CPDM behavior for concrete model) to present load deflection difference of each case on each model, then normalized deflection (ΔABAQUS/Δcracked/Δ) is calculated for each λ (Mact/Mcr) to represent the different ratios of corrections over variance of super imposed dead load on slab.

Finally, for two way flat slab, charts were presented for different cases of loading methodology, applied super-imposed dead load, lower and top reinforcement ratios to correct the deflection calculated from CSI SAFE (Using ACI318 Equation and Cracking Criteria),and correction factor of Branson equation used in both ACI 318 code and ECB-207 code is derived for one way flat slab.

Keywords: Nonlinear analysis, Material nonlinearity, Reinforced concrete, reinforcing steel, Geometric nonlinearity, Concrete Damage Plasticity model, CPDM

Content

Table of Content

Acknowledgement iv

List of Publications v

Abstract vii

Content viii

List of Figures xii

List of Table xvii

Nomenclature xviii

Abbreviations xix

List of Equations xx

Chapter 1: Introduction 1

1 Introduction 2

1.1 General and Importance 2

1.2 Scope and Objective 2

1.3 Thesis Outline 2

Chapter 2: LITERATURE REVIEW ..... - 4 -

2 Literature Review ..... - 5 -

2.1 Introduction ..... - 5 -

2.2 Types of Reinforced concrete slabs ..... - 5 -

2.2.1 One way Solid Slabs ..... - 5 -

2.2.2 Two way solid slabs ..... - 6 -

2.2.3 Flat slab (Beamless slab) ..... - 6 -

2.3 Historical Background of Theoretical Studies of Moment of Inertia Prediction ..... - 8 -

2.4 Previous Studies for F.E Modeling for RC Elements ..... - 11 -

2.5 Moment of Inertia Prediction for RC Element Deflection Calculation According to Different codes. ..... - 13 -

2.5.1 According to ACI Code (ACI 318-14) ..... - 13 -

2.5.2 According to Egyptian Code (ECP-2003) - 14 -
2.5.3 According to Euro code (EN1992-1-1) - 14 -
2.6 Compressive Strength - 15 -
2.7 Cracking and Tensile Strength of Concrete - 15 -
2.8 Modulus of Elasticity and Stress-Strain Relationships - 16 -
2.9 Need for the Current Research - 17 -
Chapter 3: FINITE ELEMENT ANALYSIS 18
3 FINITE ELEMENT ANALYSIS 19
3.1 Introduction 19
3.2 ABAQUS Program Description 19
3.3 Non-linear Behavior in ABAQUS Program 20
3.4 Concrete Damage Plasticity Model 20
3.4.1 Plasticity part 22
3.4.1.1 Yield function 22
3.4.1.2 Flow rule 26
3.4.1.3 Hardening law 27
3.5 Implementation of CPDM in ABAQUS 29
3.5.1 Plasticity parameters 29
3.5.1.1 Dilation angle ψ 29
3.5.1.2 Eccentricity 29
3.5.1.3 F_{b0}/F_{c0} 29
3.5.1.4 Viscosity parameter 29
3.5.1.5 Kc parameter 29
3.5.2 Uniaxial tension and compression stress behavior 30
3.6 Structural Element Types 32
3.6.1 For Shell Element 32
3.6.1.1 Thick VS Thin Shell 32
3.6.1.2 Finite-strain versus small-strain shell elements 33
3.7 Modeling of Reinforcement 33
3.8 Verification of ABAQUS Program 35

3.8.1 MC Neice experiment....35
3.8.1.1 Material Properties....35
3.8.1.2 Loading, Time Step and Boundary Conditions....36
3.8.1.3 Element Type, Modeling and Meshing....37
3.8.1.4 Finite element result....37
3.8.2 Xing Ma Experiment....38
3.8.2.1 Material Properties....38
3.8.2.2 Loading, Time Step and Boundary Conditions....39
3.8.2.3 Element Type, Modeling and Meshing....40
3.8.2.4 Finite element result....40
3.8.3 Mazan D. Abdullah Experiments....42
3.8.3.1 Material Properties....42
3.8.3.2 Loading, Time Step and Boundary Conditions....43
3.8.3.3 Element Type, Modeling and Meshing....44
3.8.3.4 Finite element result....44
3.9 Conclusion....46
Chapter4: PARAMETRIC STUDY....47
4 PARAMETRIC STUDY....48
4.1 Introduction....48
4.2 Description of the Analyzed Flat Slab....48
4.2.1 Loading and Boundary Conditions,....48
4.2.2 Loading Methodology....48
4.2.3 Reinforcement....51
4.3 Material Properties....51
4.4 Investigated Parameters....54
٤.٥ Results and Graphs....55
4.5.1 For A_{st} =0.1%....70
4.5.1 For Ast=0.20%....84
4.5.2 For Ast =0.3٠%....98
4.5.3 For Ast =0.4٠%....- 112 -

4.6 Discussion and comments ..... - 126 -
4.6.1 Effect of increasing load ..... - 126 -
4.6.2 Effect of increasing Lower Reinforcement ..... - 126 -
4.6.3 Effect of increasing Upper Reinforcement ..... - 127 -
4.6.4 Effect of increasing Flat Slab Span ..... - 127 -
4.7 Summary and Conclusions ..... - 128 -
Chapter5: SUMMARY AND CONCLUSIONS ..... - 129 -
5 Proposed Method for one-way Flat Slab ..... - 130 -
5.1 Introduction ..... - 130 -
5.2 Description of the Analyzed Flat Slab ..... - 130 -
5.2.1 Loading and Boundary Conditions, ... - 130 -
5.2.2 Reinforcement ..... - 130 -
5.3 Material Properties ..... - 130 -
5.4 Proposed Equation ..... - 135 -
٥.٥ Results and Graphs ..... - 137 -
5.5.1 For Ast=0.00% ..... - 138 -
5.5.2 For Ast=0.10% ..... - 143 -
5.5.3 For Ast=0.20% ..... - 148 -
5.5.4 For Ast=0.30% ..... - 153 -
5.5.5 For Ast=0.40% ..... - 158 -
5.6 Discussion and Comments ..... - 163 -
5.7 Conclusions ..... - 165 -
Chapter6: SUMMARY AND CONCLUSIONS ..... - 166 -
6 SUMMARY AND CONCLUSIONS ..... - 167 -
6.1 Summary ..... - 167 -
6.2 Conclusions ..... - 167 -
6.3 Suggestions for Future Research ..... - 168 -
Chapter7: References ..... - 169 -
7 References ..... - 170 -

List of Figures

Figure 2-1 One Way and Two Way Slab ..... - 6 -
Figure 2-2 Flat Slab system Types ..... - 7 -
Figure 2-3 Effective Moment Of Inertia To Actual Moment Relation ..... - 14 -
Figure 2-4 Effective Moment Of Inertia stress Strain relation ..... - 14 -
Figure 3-1 the evolution of the meridional section of the yield surface during hardening 25
Figure 3-2 the evolution of the deviatoric section of the yield surface during hardening for a constant volumetric stress of $\sigma V = -fc/3$ 25
Figure 3-3 The two hardening laws qh1 (solid line) and qh2 (dashed line). 27
Figure 3-4 The initial inclination of the hardening curve qh1 at $\kappa p = 0$ is positive and finite, and the inclination of both qh1 and qh2 at $\kappa p = 1$ is Hp, ... 28
Figure 3-5 Compression and Tension Behavior in Concrete Damage Plasticity Model 30
Figure 3-6 Naming Element Coding System In ABAQUS 32
Figure 3-7 ABAQUS Conventional versus continuum shell element 34
Figure 3-8 McNeice Slab Experiment 35
Figure 3-9 McNeice Load-Deflection Data for Both Experimental and FEM 37
Figure 3-10 Xing Ma Slab Experiment 38
Figure 3-11 Xing Ma Load-Deflection Data for Both Experimental and FEM 41
Figure 3-12 Mazan D. Slab Experiment 42
Figure 3-13 Mazan D Load-Deflection Data for all Experimental and FEM 45
Figure 4-1 Total Load Definition in CSI SAFE 49
Figure 4-2 Incremental Load in CSI SAFE 50
Figure 4-3 Incremental loading effect on stiffness according to newton Rapson approach Loading Definition in CSI SAFE 50
Figure 4-4 Moment versus curvature for a reinforced slab member 51
Figure 4-5 Loading and Boundary Condition For Two Way Flat Slab 54
Figure 4-6 Load Deflection Curve for Case A-6000-100-02-00 56
Figure 4-7 Load Deflection Curve for Case A-7000-100-02-00 56
Figure 4-8 Load Deflection Curve for Case A-8000-100-02-00 57
Figure 4-9 Load Deflection Curve for Case A-9000-100-02-00 57
Figure 4-10 Load Deflection Curve for Case A-10000-100-02-00 58
Figure 4-11 Load Deflection Curve for Case A-6000-100-03-00 58
Figure 4-12 Load Deflection Curve for Case A-7000-100-03-00 59
Figure 4-13 Load Deflection Curve for Case A-8000-100-03-00 59
Figure 4-14 Load Deflection Curve for Case A-9000-100-03-00 60
Figure 4-15 Load Deflection Curve for Case A-10000-100-03-00 60