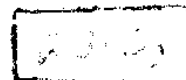


**AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
IRRIGATION AND HYDRAULICS DEPARTMENT**

**FINITE ELEMENT ANALYSIS OF WATER STRUCTURE
SYSTEMS**

**BY
AYMAN ZAKARIA AWAD
B. Sc. CIVIL ENGINEERING
AIN SHAMS UNIVERSITY**

**A THESIS
SUBMITTED IN PARTIAL FULFILLMENT FOR THE
REQUIREMENTS OF THE DEGREE OF
MASTER OF SCIENCE
IN CIVIL ENGINEERING**



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1995

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

نزول مرجع



وفوق كل شيء على كل شيء

صَدَقَ اللَّهُ الْعَظِيمُ



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STATEMENT

This dissertation is submitted to Ain Shams University for the degree of **Master of Science in Civil Engineering**.

The Work included in this thesis was carried out by the author in the Irrigation & Hydraulics Department, Ain Shams University, **from**

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

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ABSTRACT

Steel gates are important elements in hydraulic structures. They are usually designed as 2-D problems. The present study investigates the effect of 3-D analysis on the design of miter gates which are used to retain water in navigation locks.

For important structures 3-D analysis should be used. The present study investigates the effect of loading conditions, non linear analysis and the fluid gate interaction on the design of miter gates which are used to retain water in navigation locks.

The gate is modeled as a shell element supported on horizontal girder (isoparametric beam element) on which this horizontal girder is supported on heel and miter posts, where heel post is supported on lower and upper pins.

The fluid was modeled as a 3-D fluid element on which the normal compressive stresses used in describing F.Element analysis was investigated where the modified Newton method is used in analysis and the load factor is calculated for this gate.

The study is based on using the F.E.M. through the application of F.E. program ADINA. It was found that the load factor for the failure case of the gate is about twice the existing load. The results of the fluid elements are different from those of the triangle pressure distribution of the water because the water is affected by the deformed shape and rigidity of the gate.

TABLE OF CONTENTS

LIST OF FIGURES.....	1
LIST OF TABLES.....	VII
LIST OF SYMBOLS.....	VIII

A. PROBLEM AND NUMERICAL MODEL

1 DEFINITION OF THE PROBLEM AND ASSUMPTIONS	1
1.1 Introduction.....	1
1.2 Research Objectives	3
1.3 Scope of The Thesis.....	4
1.4 Previous Work	5
1.4.1 Dimensioning of Plate.....	5
1.4.2 Design of Horizontal Girder	6
1.4.3 Design of Heel and Mitre Posts	8
1.4.4 Design of Pins and Bearings	10
1.4.5 Operating Gear for Opening and Closing the Gates.....	11
1.4.6 Lock Gate of the Sector Type	13
2. THE FINITE ELEMENT MODEL	19
2.1 Basic Nonlinear Finite Element Equations	20
2.2 Material Models.....	22
2.2.1 Linear elastic models	22
2.2.1.1 Isotropic linear elastic material.....	24
2.2.1.2 Orthotropic linear elastic material	24
2.3 Element Models	26
2.3.1 The plate-shell element.....	27
2.3.1.1 Elastic analysis.....	27
2.3.1.2 Elasto-plastic analysis	28

TABLE OF CONTENTS

2.3.2	Two-and three-dimensional fluid elements	28
2.3.3.	Isoparametric beam elements	30
2.3.3.1	Linear isobeam elements	31
2.3.3.2	Nonlinear isobeam elements	32
2.4	Iteration Procedure and Convergence Criterion	33
2.4.1	Modified Newton iteration	33
2.4.2	Convergence criteria for equilibrium iterations	34
2.5	Accuracy of the Model	35
B.	LINEAR ANALYSIS	
3.	INTRODUCTION TO THE LINEAR ANALYSIS	49
3.1	Classical Method (2-D Analysis)	52
3.2	Parametric Study Using F.E.M.	53
3.2.1	Effect of the 2-D Solution on Mitre Gate	53
3.2.2	Effect of the Plate Thickness	65
3.2.3	Effect of Boundary Conditions	72
3.2.4	Effect of Using Vertical Girder	79
3.2.5	Effect of the Sill	86
3.2.5.1	Case of horizontal girders only:	86
3.2.5.2	Case of horizontal & vertical girders	86
3.2.6	Effect of the Mitre Angle	96
3.2.7	Effect of the Moment of Inertia of the Mitre Post	102
3.2.8	Effect of Using the Diagonal Member	109
4.	INFLUENCE OF LOADING CONDITIONS	112
4.1	Analysis of Different Cases of Loading	112

TABLE OF CONTENTS

C.	NONLINEAR ANALYSIS	
5.	INTRODUCTION TO THE NONLINEAR ANALYSIS	125
5.1	The F.E.M. For Nonlinear Analysis	125
5.2	The Behavior of the Gate at the Plastic Stage	126
6.	INTRODUCTION TO THE FLUID ELEMENT	132
6.1	Three Dimension Fluid Element Problem	132
6.2	Comparison of the Fluid Element Behavior With the Nominal Pressure Distribution	132

List of Figures

S.NO.	DESCRIPTION	PAGE
Figure (1.1)	Anatomy of a Simple Lock-gate	15
Figure (1.2)	The Pressure Diagram of the Miter Gate	16
Figure (1.3)	The Upper And Lower Pin	17
Figure (1.4)	The Arrangement of the Heel Post	17
Figure (1.5)	Sector Gates Assembly	18
Figure (2.1)	Principal In-plane Material Axes For The Orthotropic Material Model For Plate Elements	39
Figure (2.2)	Example Stress Output For Plate Element	40
Figure (2.3)	Isoparametric Beam Elements	41
Figure (2.4)	Example Force Output For Isoparametric Beam Element	42
Figure (2.5)	Newton-Raphson Iterative Procedure for the Solution of Nonlinear Equilibrium Equations	43
Figure (2.6)	Deformed Shape of the First Model	44
Figure (2.7)	Deformed Shape of the Second Model	44
Figure (2.8)	Deformed Shape of the Third Model	45
Figure (2.9)	Deformed Shape of the Fourth Model	45
Figure (2.10)	Deformed Shape of the Fifth Model	46
Figure (2.11)	Deformed Shape of the Sixth Model	46
Figure (2.12)	Deformed Shape of the Seventh Model	47
Figure (2.13)	Graph to Choose the Best Model	48
Figure (3.1)	The Heel Post	55
Figure (3.2)	The Plate Analysis	55

Figure (3.26)	Bending Moment In Plane In The Girders For Case (5) of Boundary Conditions	75
Figure (3.27)	Normal Force In The Heel Post	76
Figure (3.28)	Bending Moment In The Heel Post	77
Figure (3.29)	Normal Force In HL Girder	78
Figure (3.30)	Deformed Shape of The Miter Gate, Vertical Girders: Taking Into Consideration	80
Figure (3.31)	Bending Moment In Plane, Vertical Girders: Taking Into Consideration	80
Figure (3.32)	Bending Moment Out of Plane, Vertical Girders: Taking Into Consideration	81
Figure (3.33)	Normal Force In The Girders, Vertical Girders: Taking Into Consideration	81
Figure (3.34)	Bending Moment In The Heel Post (Y-Z) Plane	82
Figure (3.35)	Normal Force In The Miter Post	83
Figure (3.36)	Bending Moment In The Miter Post (Y-Z) Plane	84
Figure (3.37)	Bending Moment In The Miter Post (X-Z) Plane	85
Figure (3.38)	Bending Moment In The Plane In The Girders, Vertical Girders and Sill Effect Taking Into Consideration	88
Figure (3.39)	Bending Moment Out of The Plane In The Girders, Vertical Girders and Sill Effect Taking Into Consideration	88
Figure (3.40)	Normal Force For HL Girder	89
Figure (3.41)	N.F In The Heel Post	90
Figure (3.42)	M22 In The Heel Post	91
Figure (3.43)	N.F In The VL Girder	92
Figure (3.44)	M22 In The VL Girder	93
Figure (3.45)	N.F In The HL Girder	94
Figure (3.46)	M22 In The HL Girder	95

Figure (3.47)	Normal Force In The Plate, For The Miter Angle = 115 degree	97
Figure (3.48)	Normal Force In The Girders, For The Miter Angle = 115 degree	98
Figure (3.49)	Normal Force In The Girders, For The Miter Angle = 155 degree	98
Figure (3.50)	Normal Force In The Plate, For The Miter Angle = 155 degree	99
Figure (3.51)	Normal Force For HL Girder (B2)	100
Figure (3.52)	Bending Moment In The HL Girder (B2)	101
Figure (3.53)	Normal Force In The Plate	103
Figure (3.54)	Bending Moment In Plane For (0.1 m ⁴) Moment of Inertia of The Miter Gate	103
Figure (3.55)	Bending Moment Out of Plane For (0.1 m ⁴) Moment of Inertia of The Miter Gate	104
Figure (3.56)	Normal Force In The Girders For (0.1 m ⁴) Moment of Inertia of The Miter Gate	104
Figure (3.57)	Bending Moment In Plane For (0.1 m ⁴) Moment of Inertia of The Miter Gate	105
Figure (3.58)	Bending Moment Out of Plane For (0.01 m ⁴) Moment of Inertia of The Miter Gate	105
Figure (3.59)	Normal Force In The Girders For (0.0001 m ⁴) Moment of Inertia of The Miter Gate	106
Figure (3.60)	Normal Force In The Miter Post	107
Figure (3.61)	Bending Moment In The Miter Post	108
Figure (3.62)	Normal Force In The HL Girder (B2)	110
Figure (3.63)	Bending Moment Out of Plane In The Girders, Diagonal Member Taking Into Consideration	110
Figure (3.64)	Bending Moment In The Miter Post (Y-Z) Plane	111

Figure (4.1)	The Cases of Loading Conditions	114
Figure (4.2)	Undeformed Shape of The Miter Gate, For The Model Chosen	115
Figure (4.3)	Deformed Shape of The Miter Gate, For Working Case	115
Figure (4.4)	Normal Force In The Girders for Working Case	116
Figure (4.5)	Normal Force In The Plate For Working Case	116
Figure (4.6)	Normal Force In The Girders For Emergency Case	117
Figure (4.7)	Normal Force In The Plate For Emergency Case	117
Figure (4.8)	Normal Force In The Girders For Failure Case	118
Figure (4.9)	Normal Force In The Plate For Failure Case	118
Figure (4.10)	Longitudinal Stress In HL. Girder (B2) Nearest Edge	119
Figure (4.11)	Transverse Stress In HL. Girder (B2) Nearest Edge	120
Figure (4.12)	Normal Force In The Plate Along X-axis	121
Figure (4.13)	Longitudinal Stress In VL. Girder (B14) Nearest Edge	122
Figure (4.14)	Transverse Stress In VL. Girder (B14) Nearest Edg	123
Figure (4.15)	Bending Moment In The Heel Post	124
Figure (5.1)	Nonlinear Model	127
Figure (5.2)	Elastic-plastic material Model For Iso-Beam Element	128
Figure (5.3)	Gauss Integration	128
Figure (5.4)	Hammer's Integration Point Locations Used in Plate/Shell Element Calculations	129
Figure (5.5)	Displacement at Node (21) and the Load Factor	130
Figure (5.6)	Accumulative Plastic Strain At Shell Element (1) And The Load Factor	131
Figure (6.1)	Stresses At a Point In The Fluid Element Model	135
Figure (6.2)	Face (1) of The Fluid Element Model	136

Figure (6.3)	Face (2) of The Fluid Element Model	137
Figure (6.4)	Face (3) of The Fluid Element Model	138
Figure (6.5)	Face (4) of The Fluid Element Model	139
Figure (6.6)	Face (5) of The Fluid Element Model	140
Figure (6.7)	Pressure Dist. at (0.0 m) From Miter Gate	141
Figure (6.8)	Pressure Dist. at (2 m) From Miter Gate	142
Figure (6.9)	Pressure Dist. at (4 m) From Miter Gate	143
Figure (6.10)	Pressure Dist. at (6 m) From Miter Gate	144
Figure (6.11)	Pressure Dist. at (8 m) From Miter Gate	145
Figure (6.12)	Pressure Dist. at (10 m) From Miter Gate	146