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STATISTICAL MODEL FOR LEVELS CHANGE IN THE RIVER NILE WITH GIS APPLICATION

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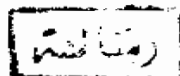
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A Thesis
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of the Requirements for the Degree of
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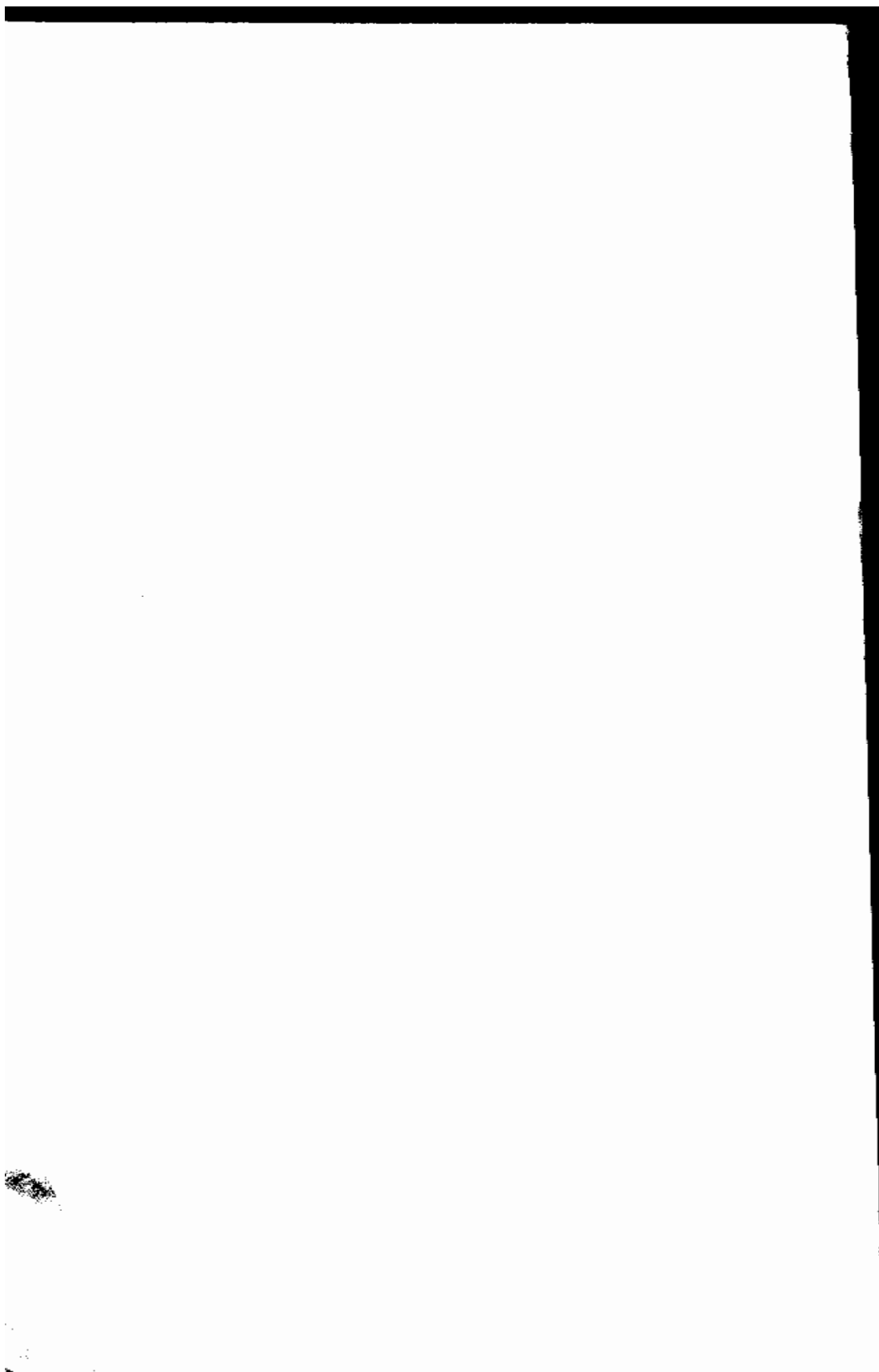
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Cairo, Egypt
1996







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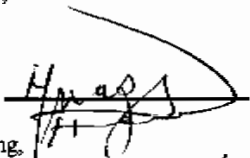
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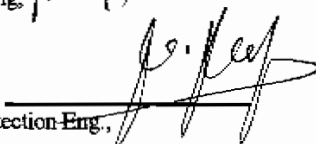
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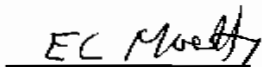
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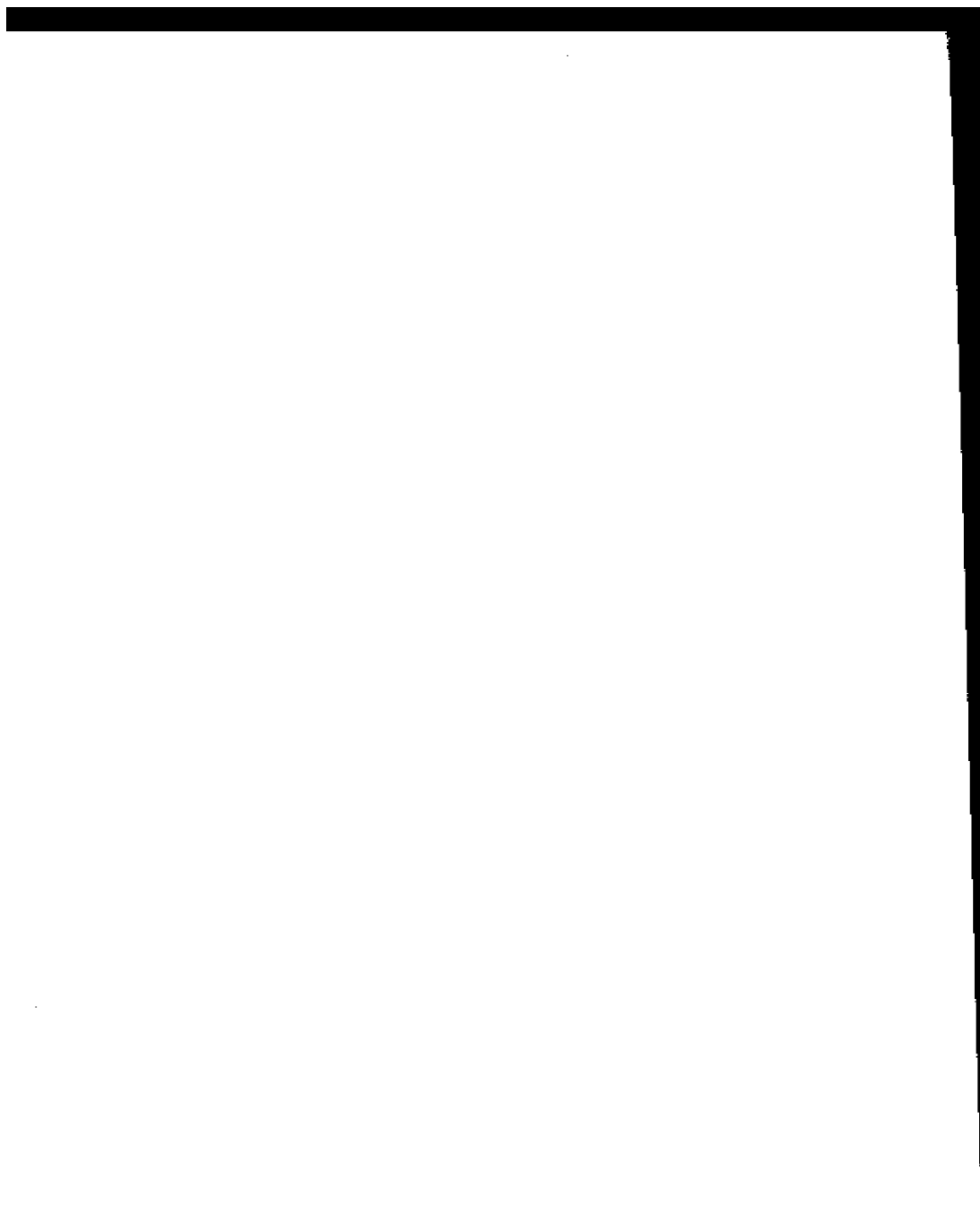


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STATEMENT

This thesis is submitted to the Irrigation & Hydraulics Department, Faculty of Engineering, Ain Shams University in the fulfillment of the requirement for the degree Doctorate of Philosophy.

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

Date : 6/8/1996

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the 1990s, the number of people in the UK who are employed in the public sector has increased by 1.5 million, from 2.5 million in 1980 to 4 million in 1995. The public sector has become a major employer in the UK, and its growth has been a key factor in the overall growth of the economy.

The public sector has also become a major provider of social services, and its growth has been a key factor in the overall growth of the economy. The public sector has become a major provider of social services, and its growth has been a key factor in the overall growth of the economy. The public sector has become a major provider of social services, and its growth has been a key factor in the overall growth of the economy.

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ABSTRACT

This study is aimed to develop a computer software system that makes use of the historical data of the River Nile to identify the potential location of the hydraulic problems, due to water management policy and the new construction effect, using the GIS technology. During the development of this system, three different modules are developed to perform three different tasks.

The first module was developed to handle data input and output for the historical data that are available at Nile Research Institute (NRI). This module was developed using database management information system to be able to handle such huge amount of data.

The second module was developed for water surface profile calculation that corresponds to certain water management parameters (reach discharges and reach downstream water levels). The water surface profile calculation is conducted using multi input-single output rating curve method.

The third module was developed for a three dimensional GIS analysis to answer the required questions and highlight the potential location of the hydraulic problems that corresponds to the calculated water surface profile. Performing a three dimensional GIS analysis will answer the required questions and identify the potential location of the inquired problem.

As an application for the system, two case studies at Sharona, just upstream of Maghagha city, and at El-Zawya, just upstream Menia city, were conducted. These sites are suffering from navigational bottlenecks as there are many submerged islands. The system application at these sites includes the input of the new surveyed cross sections. The system output are contour maps for both bed elevations and depths. It also includes the potential location of the navigational bottlenecks. The system output also include the volume of dredging if it is desired to do so.

Key Words

River Nile, Database, Water Surface Profile, Back Water Curve, Rating Curves, Lag Time, Navigation, Navigational Bottleneck, Geographic Information System, and GIS.

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NRI DATABASE

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Thanks are due to the Nile Research Institute, National Water Research Center for providing hardware and software facilities that are used to perform this study and also providing the available data used as system application.

Thanks are due to the River Nile Protection and Development Project for providing the digital format of the contour maps used in this study.

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Many thanks to my colleagues Eng. Nadia Abd El-Salam and Eng. Fawzan Salem for helping in developing the Database system. The author would like to thank his colleagues Eng. Mostafa EL-Samany, Eng. Nader Shafik, Eng. Magdy Gad El-Rab, and Eng. Sherin Shawky for the valuable discussions and comments regarding Geographic Information System.

I wish to express my deepest thanks, gratitude, and appreciation to my parents, my dear wife Doaa, and my lovely son Abd El-Rahman for being so supportive, understanding, patient, and Kind throughout the time of this study. I owe them a lot of this accomplishment and I cannot thank them enough. To all of them, I would like to present this dissertation.

TABLE OF CONTENTS

ABSTRACT	i
ACKNOWLEDGMENTS	iii
TABLE OF CONTENTS	v
LIST OF FIGURES	xi
LIST OF TABLES	xiii
LIST OF SYMBOLS	xv
LIST OF ABBREVIATIONS	xvii
LIST OF DEFINITIONS	xix
CHAPTER 1	
INTRODUCTION	1
1.1 Background	1
1.2 Objective	2
1.3 Scope of Work	3
CHAPTER 2	
LITERATURE REVIEW	5
2.1 Introduction	5
2.2 River Nile Database	6
2.3 Water Surface Profile Calculation	8
2.3.1 Rating Curves Methods	10
2.3.2 Theoretical Methods for Backwater Curve	19
A- Graphical Integration Method	20
B- Direct Integration Method	21
C- Direct Step Method	21
D- Standard Step Method	22
E- Other Methods	22

F- Computer Models	23
2.4 Navigational Bottlenecks Within the River Nile	23
2.5 Geographic Information System	25
2.5.1 GIS Definition	25
2.5.2 Spatial and Attribute Data	26
2.5.3 Three Dimensional GIS Analysis	26
A- Contour Lines	27
B- Triangulated Irregular Network (TIN)	27
C- TIN Triangulation Method	27
D- TIN Components	29
E- Interpolating the Z Values	31
F- Tolerances Used to Generate the TIN	32
2.5.4 Questions That GIS Can Answer	32
2.5.5 GIS Sample Applications	35
 CHAPTER 3	
SYSTEM REQUIREMENTS AND ANALYSIS	37
3.1 Introduction	37
3.2 Hardware and Software Requirements	38
3.3 System Design	40
3.3.1 Data Management Module	41
A- Technology, Software, and Programming Technique	41
B- Data Types and Availability	42
C- Module Output	43
D- Module Utility	43
3.3.2 Water Surface Profile Calculation Module	44
3.3.3 Three Dimensional GIS Analysis Module	45
A- Technology, Software, and programming technique	45
B- Data Types and Availability	46
C- Module Output	46
 CHAPTER 4	
DATA MANAGEMENT MODULE	49
4.1 Introduction	49
4.2 Module Analysis	49
4.2.1 User-Friendly Standard Windows Interface	50

4.2.2 Minimum Database Size	50
A- Decimal Coding System	51
B- Hexadecimal Coding System	51
C- ASCII Coding System	51
4.2.3 Event Driven Programming	52
4.2.4 Data Driven Programming	52
4.2.5 Multi-Language Ability	54
4.2.6 Multi-Task Ability	54
4.2.7 Multi-User Ability	55
4.2.8 Different Levels of User Priorities	55
4.2.9 Different Output Devices	57
4.2.10 Different Software Packages Interface	57
4.3 Module Design	58
4.3.1 Module Menu	60
4.3.2 Control Panel	62
4.3.3 Data Windows	62
A- Cross Sections Data Windows	63
B- Water Levels Data Window	65
C- Discharge Data Window	66
4.3.4 Print Window	68
4.3.5 Draw Window	69
4.3.6 System Windows	70
A- Cross Sections Types Coding Window	70
B- Special Mission Coding Window	70
C- Discharges/Water Levels Coding Window	71
D- User Trustees Window	71
4.3.7 Utility Windows	72
A- Browse Window	72
B- Zoom Window	73
C- Print Device Selection Window	73
D- Axes Selection Window	74
E- Drawing Setup Window	74
F- Axis Setup Window	75
G- Curve Setup Window	75
H- Message Window	76
I- Answer Window	76

CHAPTER 5

WATER SURFACE PROFILE CALCULATION MODULE

.....	77
5.1 Introduction	77
5.2 Module Theory	78
5.2.1 Rating Curve Formula	78
5.2.2 Effect of Lag Time	83
5.2.3 Rating Curve Optimization	84
5.3 Module Analysis	87

CHAPTER 6

THREE DIMENSIONAL GIS ANALYSIS MODULE

6.1 Introduction	95
6.2 Module Analysis	95
6.2.1 Water Surface Profile TIN	97
6.2.2 Bed TIN	98
6.2.3 Additional Georeferenced Data	100
6.2.4 GIS Analysis	100
6.3 Module Design	102
6.3.1 Module Menu	104
6.3.2 Create Water Surface Profile TIN	106
A- Update the Rating Database File	106
B- Calculate Water Surface Profile	107
C- Input Water Surface Profile	108
6.3.3 Create Bed TIN	109
A- Generate Three Dimensional Coverage	110
B- Generate Bed Boundary Coverage	110
C- Generate the Bed TIN	111
6.3.4 Create Navigational TIN	111
A- Input Channel Centerline	112
B- Input Channel Geometry	112
C- Build Navigational TIN	113
D- Calculate Depths	113
6.3.5 3-D Analysis	114
A- Generating Contours	114
B- Profiling Cross Sections	115
C- Calculating Volume	116
D- Interpolating Elevation	116