AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
IRRIGATION AND HYDRAULICS DEPARTMENT

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

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A Thesis
Submitted for the Fulfillment
of the Requirements for the Degree of
Doctorate of Philosophy
in Civil Engineering

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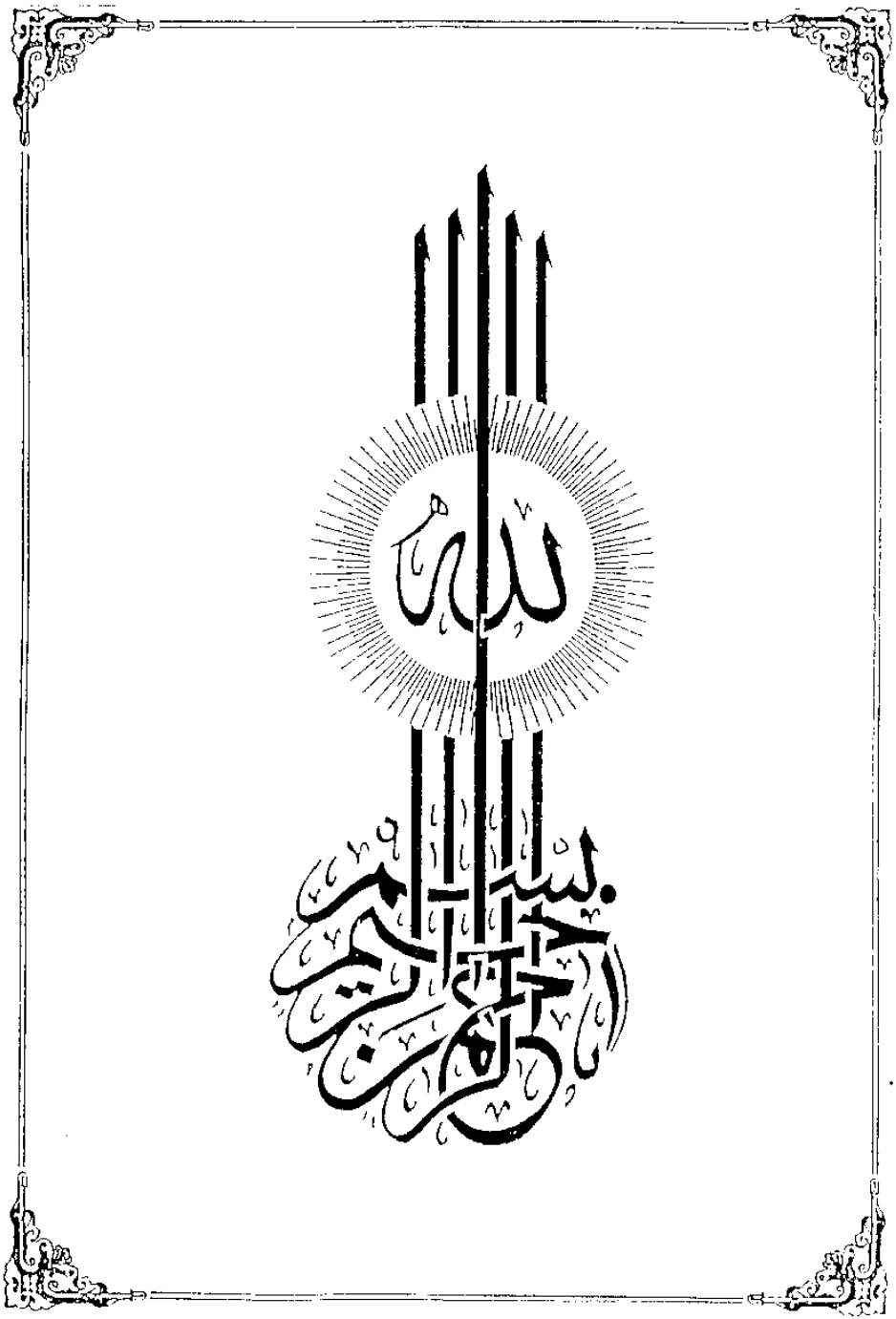

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STATEMENT

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.

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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 Wards
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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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.

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