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AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
IRRIGATION & HYDRAULICS DEPARTMENT

CHOICE OF A SUITABLE FORMULA OF SEDIMENT TRANSPORT FOR SHORE PROTECTION AT THE NILE DELTA SEA COAST.

BY
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A Thesis Submitted in Partial Fulfillment for M.Sc. Degree

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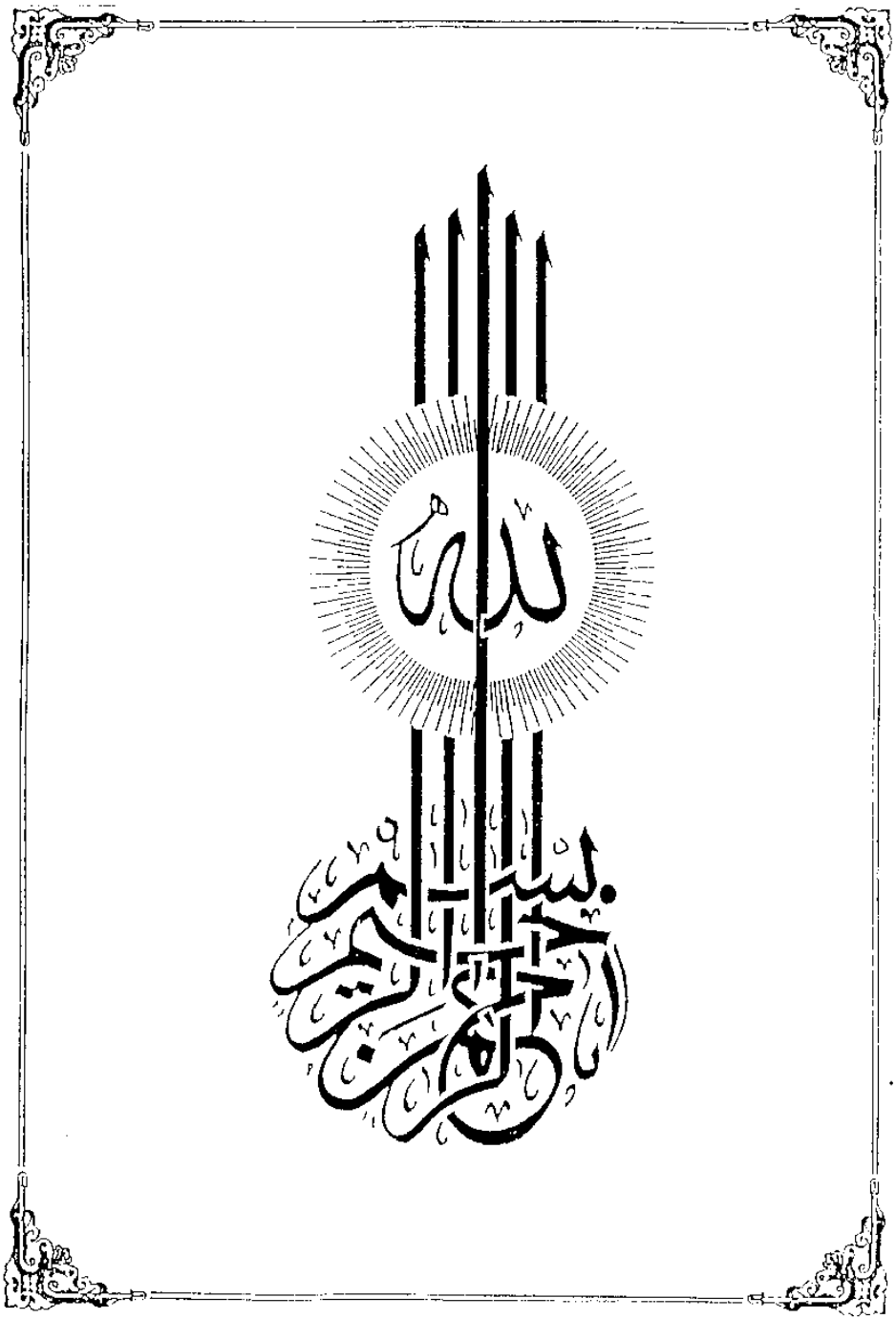

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STATEMENT

This dissertation is submitted to the Irrigation & Hydraulic Department, Faculty of Engineering, Ain Shams University in the fulfillment of the requirements for the Degree of Master of Science.

The work in this Thesis was carried out in the Irrigation & Hydraulic Department, Faculty of Engineering, Ain Shams University, from January 1994 to June 1997.

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

Ahmed Fathy Abd El-Razik Agmy. **CHOICE OF A SUITABLE FORMULA OF SEDIMENT TRANSPORT FOR SHORE PROTECTION AT THE NILE DELTA SEA COAST.** Master of Science, Ain Shams University.

The main purpose of this study is to choose the most suitable formula for calculating the longshore sediment transport rate (change in shoreline profile), along the Egyptian Northern Coast. Baltim shoreline has been chosen as an example for the Egyptian coastline.

First, the different equations which calculate the current velocity and the sediment transport rate were studied. Then four formulae of the different formulae, (CERC, Galvin, Brebner and S.P.M.) were chosen and a numerical model was constructed.

Second, the response of the model to the changing of the different coastal variables (wave period, wave angle and wave height) were studied and a comparison between their results showed that the wave height is the most dominating parameter.

Third, the model was verified at Baltim shoreline and computed shorelines were compared to the measured shorelines. It was found that the S.P.M. is the most suitable formula for the Egyptian Coastline.

Finally, the model was applied using S.P.M.

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formula to predict the shoreline at Baltim in the future or to reproduce missing maps in the past.

KEY WORDS: Velocity of current, Longshore sediment transport, Numerical Modeling.

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SUMMARY

INTRODUCTION:

Shoreline changes are caused mainly by current. These current are caused by oblique waves attaching the shoreline. Thus, these waves are the main cause for shoreline changes.

The Nile-Delta coast which extends from Alexandria to Port Said is about 300 km long. This coast is an evident example for the man-made in coastal processes. Man-made takes many forms, but it is shown clearly in the Nile-Delta coast due to the construction of various coastal structures a long it.

Structures constructed along the shoreline are the main reason for the changes of the stability of the shoreline, thus, changing the shape of the shore. These structures may be groins, jetties, seawall or breakwaters, which entrap or intercept the sediment movement. The shoreline may return to its state of equilibrium after long time or changes its shape to maintain its equilibrium.

Indeed, the most serious large scale and long term coastal erosion results from the interception of river sediment to reach the coast by the construction of the river dams. The construction of Aswan High Dam

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during this century has a sudden and disastering effects on the Nile-Delta coastal area. These effects presented in the interruption of Nile River discharge of sediment which reach the coast. Thus the action of waves and currents will continue to erode and change the principal features of the shoreline of the Nile-Delta.

OBJECTIVE OF THE STUDY:

The main objective of this study is to predict shoreline changes along the Egyptian coastline using the most suitable formula for sediment transport calculation.

The thesis cosistS of the following chapters:

Chapter One: (Introduction).

Contains an introduction for the research, the objective of the research, and the followed study phases.

Chapter Two: (Literature Review).

Contains a review of the pre-published work for sediment transport rates, transformation of waves from deep to breaking conditions, refraction of waves, and concepts of sediment transport rates acording to the one-line theory.

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Chapter Three: (Construction of the Numerical Model).

Contains the different formulae. It also displays the equations and concepts used in the model (one-line theory, waves decay in the breaking zone, continuity of sediment, and sediment transport rate formula), and the calculations procedure in the model as wall.

Chapter Four:(Numerical Model Response to the different Variables).

Contains the tests of the sensitivity of the model due to different coastal variables, the comparison between the four formula and the choice of the most suitable formula for the Egyptian Shoreline. A good level of confidence in the model resultwas perceived from the executed comparison.

Chapter Five: (Model Verification and Application).

Contains a comparison between the model results and field results for selected shoreline segments. The measured data for the shoreline segments is collected. The model is applied with the suitable formula to predict shoreline changes for some shoreline segments in the Egyptian Shoreline.

Chapter Six: (Conclusions and recommendations).

Appendices:

Contains a list of references and examples of input and output files of the model.

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