Ain Shams University
Faculty of Engineering

HYDRAULIC JUMP CONTROLLED BY JETS

By

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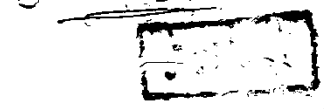
A Thesis Submitted in Fulfillment
of The Requirements of The
Ph.D.DEGREE
IN CIVIL ENGINEERING

(VOLUME I)



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CAIRO - EGYPT

1990

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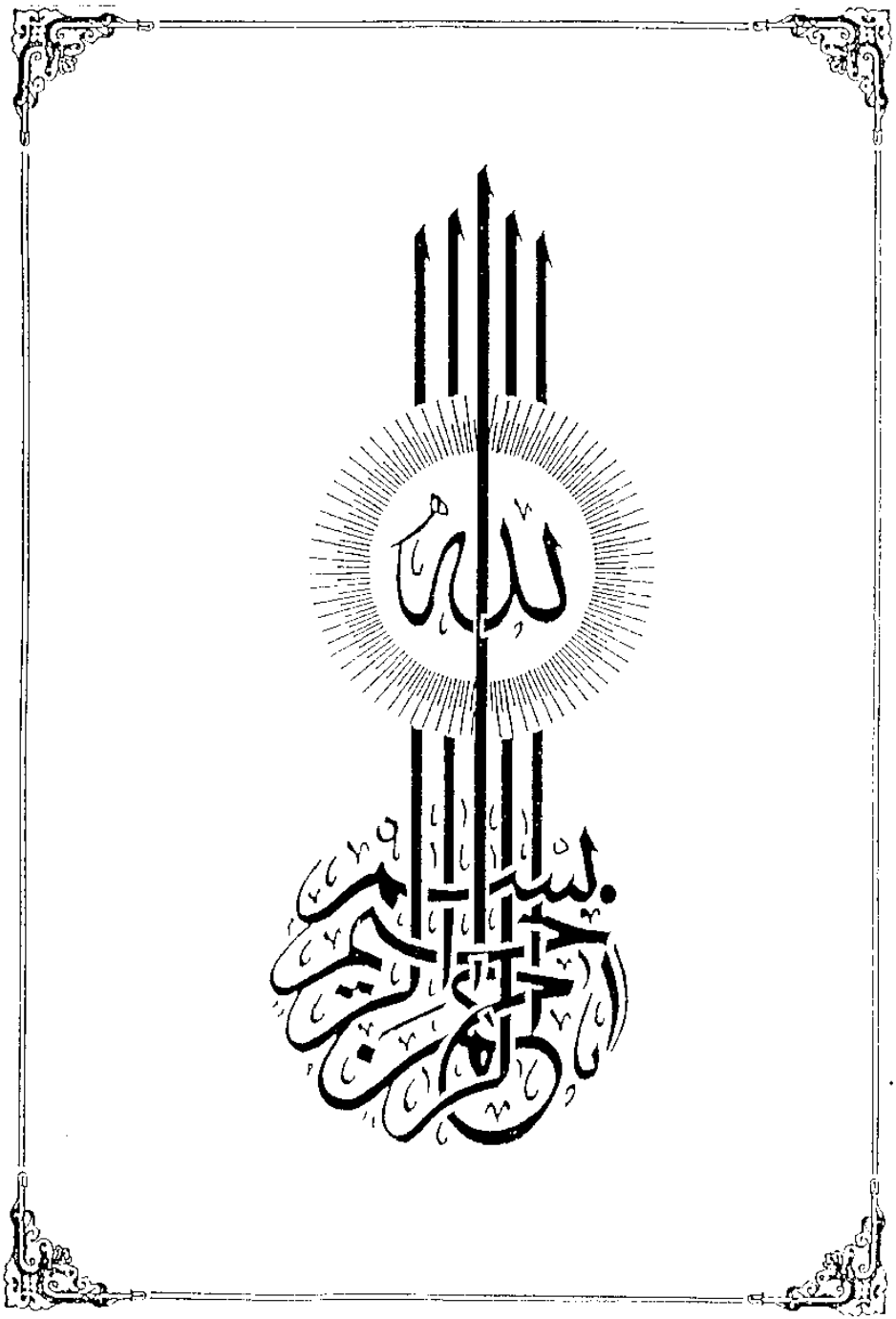

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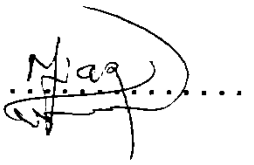

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STATEMENT

This dissertation is submitted to Ain Shams University for the degree of Ph.D. in Civil Engineering.

The work included in this thesis was carried out by the author in the Hydraulic and Irrigation Department, Faculty of Engineering, Ain Shams University, Cairo, Egypt, and in the Civil Engineering Department, The Pennsylvania State University, U.S.A., from June 1987 to September 1990.

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

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ACKNOWLEDGEMENT

I wish to express my deepest gratitude to all my supervisors for their supportive guidance during my staying at The Pennsylvania State University in the U.S.A. and after my return to Ain Shams University in Cairo, Egypt.

I am deeply indebted to Professor Dr. **Mohamed Wafaie Abdel Salam**, Professor of Irrigation Design, Faculty of Engineering, Ain Shams University, Cairo, Egypt, for his guidance, useful suggestions and valuable comments for this study.

I wish to express my thanks to Dr. **Abdel Kawi Khalifa**, Associate Professor of Irrigation Design, Faculty of Engineering, Ain Shams University, Cairo, Egypt, for his constructive advices, valuable discussions and useful revision of this work.

I also wish to express my gratitude to Dr. **Mahmoud Abdel Lateef**, Associate Professor of Irrigation Design, Faculty of Engineering, Ain Shams University, Cairo, Egypt, for his generous assistance, fruitful encouragement and constant guidance throughout this whole work.

Many thanks are also due to Professor Dr. **Joseph Reed**, Professor of Civil Engineering at The Pennsylvania State University, in the U.S.A., for his supervision and valuable discussions and revision of this work during my staying at The Pennsylvania State University.

Thanks are also due to the staff of the Hydraulic Laboratory, The Pennsylvania State University, for their contribution in the achievement of this work.

ABSTRACT

This study investigates the characteristics of the free and submerged jump controlled by floor jets.

In the theoretical study continuity and momentum principles are used to develop expressions relating the main characteristics of the flow and the hydraulic jump over floor jets. The energy equation was used to obtain the jump energy loss.

Experiments are conducted in a rectangular flume with a perforated bed. Each type of the hydraulic jump is investigated experimentally under different flow conditions and different jets arrangements and positions.

Statistical analysis is used to analyze the experimental data and regenerate the necessary characteristics design equations for the perfect, repelled and submerged jump controlled by jets. From these equations the relative jets position, the angle of inclination of the jets, and the relative jet diameter which is optimum from both the hydraulic and the economic points of view were obtained.

Finally the experimental data is used for the verification of the theoretical equations, also an evaluation of the study is presented and practical applications are discussed.

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