شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

HANAA ALY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
IRRIGATION AND HYDRAULICS

HYDRAULIC CHARACTERISTICS OF RUBBLE WEIR

A Thesis submitted in partial fulfillment of the requirements
of the degree of Master of Science in Civil Engineering
(Irrigation and Hydraulics)

By

Eng. Mohamed Ahmed Mohamed Mahmoud
B.Sc. Civil Engineering, Ain Shams University, 2010
Master Student, Irrigation & Hydraulics Department
Faculty of Engineering, Ain Shams University

Supervised By

Prof. Dr. Mohamed Mohamed Nour El-Din
Prof. Irrigation & Hydraulics Dept. Ain Shams University

Prof. Dr. Yehia Kamal Abdelmonim
Prof. Irrigation & Hydraulics Dept. Ain Shams University

Dr. Hesham Nazmy Farres
Ass. Prof. Irrigation & Hydraulics Dept. Ain Shams University

Cairo - (2020)

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
IRRIGATION AND HYDRAULICS

HYDRAULIC CHARACTERISTICS OF RUBBLE WEIR

Eng. Mohamed Ahmed Mohamed Mahmoud
B.Sc. Civil Engineering, Ain Shams University, 2010
Master Student, Irrigation & Hydraulics Department
Faculty of Engineering, Ain Shams University

Examiners' Committee

Name and Affiliation	Signature
Prof. Dr. Osama Khairy Saleh Prof. Irrigation & Hydraulics Dept. Zagazig University	.....
Prof. Dr. Ali Mohamed Talaat Prof. Irrigation & Hydraulics Dept. Ain Shams University	.....
Prof. Dr. Mohamed Mohamed Nour El-Din Prof. Irrigation & Hydraulics Dept. Ain Shams University	.....
Prof. Dr. Yehia Kamal Abdelmonim Prof. Irrigation & Hydraulics Dept. Ain Shams University	.....

Statement

This thesis is submitted as a partial fulfilment of Master of Science in Civil Engineering Engineering, Faculty of Engineering, Ain Shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

Mohamed Ahmed Mohamed Mahmoud

Signature

……...…….

Date: February 2020

Researcher Data

Name	: Mohamed Ahmed Mohamed Mahmoud
Date of birth	: 21-02-1987
Place of birth	: Egypt
Last academic degree	: Bachelor of Science in Civil Engineering
Field of specialization	: (Irrigation and Hydraulics)
University issued the degree	: Ain Shams University.
Date of issued degree	: 2010
Current job	: Master Student

Acknowledgment

I would like to express my thanks and obligation to whom helped me that without their help the completion of this work was impossible.

I wish to express my deep gratitude to **Prof. Dr. Mohamed Mohamed Nour El-Din**, professor of irrigation and drainage, Faculty of Engineering, Ain Shams University. I wish to thanks him for his kind supervision, useful suggestions, and constructive criticism.

I am deeply indebted to **Prof. Dr. Yehia Kamal Abdel-Monim**, professor of irrigation and drainage, Faculty of Engineering, Ain Shams University, for his guidance, kind encouragement, useful suggestions, generous devotion his time and effort throughout this work and his patience in revising this thesis.

I wish to extend my sincere thanks to **Dr. Hesham Nazmy Farres**, Ass. Professor, Irrigation and Hydraulics Department, Faculty of Engineering, Ain Shams University, for his constant supervision, invaluable advises.

Thanks to all the technical staff of the Hydraulic Laboratory, Faculty of Engineering, Ain Shams University, for help and cooperation during the experimental work.

Thesis Summary

Experimental and numerical models were conducted to investigate water flow over gabion weirs. In the experimental study, the water surface profile (WSP) was measured for different discharges, flow patterns, and downstream face slopes. In the numerical study, ANSYS® FLUENT Computational Fluid Dynamics (CFD) software was used to numerically simulate the flow over gabion weirs. The Reynolds-averaged Navier-Stokes equations were solved to predict the flow domain. The volume of fluid (VOF) method was applied to treat the complex free-surface flow. The structured high dense mesh was employed. The standard k-ε turbulence model was used to analyze turbulence downstream weir. The experimental results were used to verify the numerical model by two statistical indicators; the 1st indicator is the mean absolute percent error (MAPE) and the 2nd indicator is the root mean square error (RMSE). Numerical results of the WSP showed good agreement with the experimental results. The values of RMSE and MAPE were between (0.60% – 2.49%) and (0.53% – 1.92%) respectively.

Key words: Gabions, Porous Weir, Experiment Model, CFD, VOF, Water Surface Profile (WSP).