

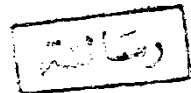
AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
IRRIGATION AND HYDRAULICS DEPARTMENT

STUDY OF THE HYDRAULIC CHARACTERISTICS OF
FLOW THROUGH RADIAL GATES

BY

AYMAN ABD EL-SATTAR MOKHTAR AHMED
(B.SC. Civil Engineering - Ain Shams University)

A Thesis
Submitted in Partial Fulfillment
of the Requirements for the degree of
MASTER OF SCIENCE
IN CIVIL ENGINEERING



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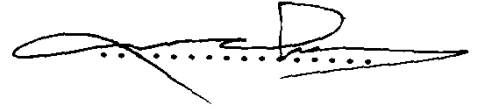
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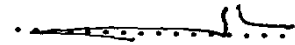
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STATEMENT

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

The work included in this thesis was carried out by the author in the department of Irrigation & Hydraulics, Ain Shams University, from December 1992 to August 1994.

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

Reprints from this thesis may be made on conditions that the full title of the thesis, name of author, page reference, and date of publication are given.

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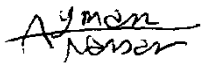
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ABSTRACT

The present study aims to investigate the relations between the discharge, the gate characteristics, and the water depths (upstream and downstream) to suggest an algorithm for control purposes of radial gates. This algorithm gives mainly the relations between the gate opening, the upstream water depth and the water depth just downstream the gate to keep the discharge constant.

In the theoretical study, dimensional analysis is adopted to investigate the different parameters affecting the discharge, as well as the parameters affecting the gate opening. Also some equations which are needed for the algorithm were deduced in this theoretical study.

Experimental study was carried out in a rectangular reinforced concrete flume in the laboratory of Irrigation and Hydraulics Department, Faculty of Engineering, Ain Shams University. A model of radial gate with two vents was used to carry out the experimental work.

Results of the experimental data analysis are presented as a series of graphs showing essentially the relations between the water depths at upstream section, downstream section, and just downstream the gate for

constant discharge. These figures are explained analytically using the developed theoretical equations. Also the relations between the pressure head over the gate, the gate opening, and the discharge are presented.

An algorithm is developed giving the equations between the gate opening and its affecting variables. This algorithm can be applied for the automatic regulation of radial gates. The verification of this algorithm is done to measure the accuracy of the developed algorithm.

Design charts are plotted in order to give the gate opening according to the upstream water depth, the water depth just downstream the gate, and the discharge.

Finally, some of the raw data are tabulated in appendix A.

TABLE OF CONTENTS

CHAPTER I : INTRODUCTION	1
CHAPTER II : LITERATURE REVIEW	6
2.1 GENERAL	6
2.2 GATES	6
2.3 VERTICAL GATES	8
2.3.1 VERTICAL GATES ON A HORIZONTAL FLOOR	8
2.3.2 VERTICAL GATES PROVIDED WITH A SILL	15
2.4 RADIAL GATES (TAINTER GATES)	17
2.4.1 RADIAL GATES ON A HORIZONTAL FLOOR	19
2.4.2 RADIAL GATES PROVIDED WITH A SILL .	38
CHAPTER III : THEORETICAL APPROACH	40
3.1 GENERAL	40
3.2 HYDRAULIC CHARACTERISTICS OF FLOW UNDER GATES	40
3.3 THEORETICAL ANALYSIS	43
3.4 DIMENSIONAL ANALYSIS	46
3.5 EMPIRICAL FORMULA FOR THE GATE OPENING .	48
CHAPTER IV : EXPERIMENTAL STUDY	50
4.1 INTRODUCTION	50

4.2 DESIGN OF THE MODEL	50
4.3 THE EXPERIMENTAL APPARATUS	51
4.3.1 THE FLUME	51
4.3.2 THE TAIL WATER GATE	54
4.3.3 THE MODEL	55
4.4 METHODS OF MEASURING AND INSTRUMENTS	59
4.4.1 MEASURING OF DISCHARGE	59
4.4.2 MEASURING OF WATER DEPTHS	60
4.4.3 MEASURING OF PRESSURE HEADS	61
4.4.4 CHOOSING OF GATE OPENINGS	62
4.4.5 MEASURING OF GATE LIP ANGLES	63
4.5 PRELIMINARY TESTS	65
4.6 EXPERIMENTAL PROCEDURE	65
CHAPTER V : EXPERIMENTAL RESULTS	68
5.1 INTRODUCTION	68
5.2 FEATURES OF THE FLOW	68
5.3 RELATION BETWEEN $\frac{y_{ds}}{G}$ & $\frac{y_{go}}{G}$	69
5.4 RELATION BETWEEN $\frac{y_{ds}}{G}$ & $\frac{y_{us}}{G}$	73
5.5 VARIATION OF THE PRESSURE HEAD ON THE GATE WITH W & Q	77
CHAPTER VI : ANALYSIS AND DISCUSSION	79
6.1 INTRODUCTION	79
6.2 RELATION BETWEEN y_{ds} & y_{go}	79
6.3 RELATION BETWEEN y_{ds} & y_{us}	80

6.4 VARIATION OF THE PRESSURE HEAD ON THE GATE	
WITH W & Q	81
6.5 RELATION BETWEEN W & y_{ds} AT CONSTANT y_{us} . . .	82
6.6 RELATION BETWEEN θ & y_{ds} AT CONSTANT y_{us} . . .	83
6.7 RELATION BETWEEN W & y_{us} AT CONSTANT y_{ds} . . .	87
6.8 RELATION BETWEEN θ & y_{us} AT CONSTANT y_{ds} . . .	88
6.9 CONTROL ALGORITHM	92
6.10 CONTROL DESIGN CHARTS	97
6.11 VERIFICATION OF THE ALGORITHM	102
6.12 SOURCES OF ERRORS	105
6.13 ILLUSTRATIVE EXAMPLE	107
CHAPTER VII : CONCLUSIONS AND RECOMMENDATIONS . . .	111
7.1 INTRODUCTION	111
7.2 SUMMARY OF WORK	111
7.3 CONCLUSIONS	112
7.4 LIMITATIONS	115
7.5 RECOMMENDATIONS FOR FURTHER RESEARCH . . .	116
REFERENCES	118
APPENDIX A : FLOW MEASUREMENTS	122
ARABIC SUMMARY	130

LIST OF FIGURES

FIGURE (1-1)	WATER PRESSURE ACTING ON THE GATE . . .	2
FIGURE (1-2)	VARIATION OF THE DOWNSTREAM WATER DEPTH WITH THE DEMAND	3
FIGURE (2-1)	FORMS OF FLOW UNDER VERTICAL GATES AND THE PARAMETERS AFFECTING IT	9
FIGURE (2-2)	RELATION BETWEEN C_c , C_d AND W/Y_{us} AS INTRODUCED BY ROUCE (1946)	11
FIGURE (2-3)	RELATION BETWEEN C_d & y_{us}/W AND y_{ds}/W FOR FREE FLOW AND SUBMERGED FLOW CONDITIONS AS INTRODUCED BY HENRY (1950)	12
FIGURE (2-4)	DEFINITION SKETCH OF FLOW THROUGH A VERTICAL GATE PROVIDED WITH A CYLINDRICAL LIP .	14
FIGURE (2-5)	DIFFERENT FORMS OF THE USED SILLS BY SALAMA (1978)	16
FIGURE (2-6)	FORMS OF FLOW THROUGH RADIAL GATES AND THE PARAMETERS AFFECTING IT	18
FIGURE (2-7)	CONFIGURATIONS OF THE GATE LIP SEALING	19
FIGURE (2-8)	VALUES OF C_d OF RADIAL GATES AS INTRODUCED BY METZLER (1948) (R CONSTANT)	20

FIGURE (2-9)	VALUES OF C_c FOR DIFFERENT VALUES OF LIP ANGLE (θ) AS INTRODUCED BY TOCH AND ASCE (1953)	21
FIGURE (2-10)	VALUES OF C_d AS A FUNCTION OF (Y_{us}/R) FOR FREE FLOW AND SUBMERGED FLOW AS INTRODUCED BY TOCH AND ASCE (1953) (G/R CONSTANT)	21
FIGURE (2-11)	VALUES OF C_d AS INTRODUCED BY U.S. ARMY CORPS OF ENGINEERS, AND THE WATERWAYS EXPERIMENTAL STATION (1960)	23
FIGURE (2-12)	VALUES OF C_c AS A FUNCTION OF (W/Y_{us}) & θ AS INTRODUCED BY ANWAR (1964)	24
FIGURE (2-13)	VALUES OF C_c AS A FUNCTION OF θ AS INTRODUCED BY HENDERSON (1966)	25
FIGURE (2-14)	RELATION BETWEEN C_d & W/Y_{us} FOR AN ERROR $\pm 5\%$ IN Y_{ds}	26
FIGURE (2-15)	COMPARISON BETWEEN GILL'S CALCULATED RESULTS AND TOCH'S EXPERIMENTAL DATA	28
FIGURE (2-16)	VALUES OF C_d FOR FREE FLOW AND SUBMERGED FLOW FOR A HARD RUBBER CONFIGURATION AS INTRODUCED BY THE BUREAU OF RECLAMATION (1983)	30
FIGURE (2-17)	VERIFICATION OF ALGORITHM'S RESULTS FOR HARD RUBBER BAR DESIGN IN SUBMERGED FLOW CONDITIONS AT $Y_{ds}/G = 0.8$	31