

Ain Shams University
Faculty of Engineering

STUDY OF FREE FLOW CONDITIONS FOR SILL UNDER GATES

BY

Eng. Gamal Mohamed Mustafa Abdelaal



A THESIS



Submitted in Partial Fulfillment of the Requirements
for the Degree of MSc. in Civil Engineering

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E.M.

SUPERVISED BY

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Associate Professor,
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بسم الله الرحمن الرحيم

..... رَبِّ أَوْزِعْنِي أَنْ أَشْكُرَ
نِعْمَتَكَ الَّتِي أَنْعَمْتَ عَلَيَّ وَعَلَىٰ وَالِدَيَّ وَأَنْ أَعْمَلَ صَالِحًا
تَرْضَاهُ وَأَصْلِحْ لِي فِي ذُرِّيَّتِي ^ط إِنِّي تُبْتُ إِلَيْكَ وَإِنِّي
مِنَ الْمُسْلِمِينَ ﴿١٥﴾

صدق الله العظيم

" سورة الاحقاف "

TO
MY FAMILY

EXAMINERS COMMITTEE

Name, Title & Affiliation

Signature

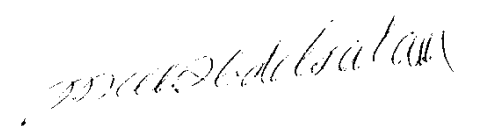
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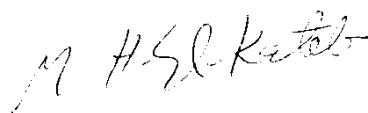
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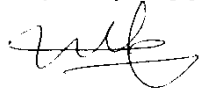
STATEMENT

This Thesis is submitted to Ain Shams University for the degree of M. Sc. in Civil Engineering.

The work included in this Thesis was carried out by the author in the Department of Irrigation and Hydraulics, Ain Shams University, from October 1986 to Sep. 1990.

No part of this Thesis has been submitted for a degree or a qualification at any university or institution.

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ABSTRACT

The objective of the present study is to investigate the effect of using under gate sill with different downstream slopes and of different heights upon the characteristics of the free hydraulic jump. In the theoretical study, the dimensional analysis was employed to relate the different factors affecting the studied phenomena. Moreover, the continuity equation and the impulse-momentum principles, were used to get expressions relating the relative depth and the other parameters. Experiments were conducted on a small rectangular channel. Models with different downstream slopes (1:1, 3:1, 5:1, 7:1 & 9:1) and of different heights (1, 2 & 3 cm) were tested using variable flow parameters.

Using the experimental data, relationships were plotted to describe the main characteristics of the free hydraulic jump. The experimental data were analyzed and the results of this analysis were presented graphically in a number of charts.

It was found that the case on nonsilled-gate gives the shortest relative length of jump. While, the best downstream slope of sill was found to be 5:1 which gives the shortest relative length of jump within the tested models.

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