بسم اللّه الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

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بعض الوثائق الأصلية تالفة

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING

HYDRAULIC CHARACTERISTICS OF OPEN CHANNELS WITH FLOATING WEEDS

BY

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B.Sc. ZAGAZIG UNIVERSITY

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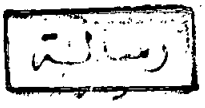

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STATEMENT

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 hydraulics laboratory at Channel Maintenance Research Institute, Kanater El-Khaireia, Egypt, to study the effect of floating weeds on the characteristics of open channels, from May 1997 to May 2001.

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 aquatic weeds infestation of open channels in Egypt is considered one of the major problems affecting our water resources. The spread of weeds in the Nile water is due to the over-transparency of the water, especially after the construction of Aswan High Dam (AHD). This over-transparency resulted because the water was almost free from sediments that were detained upstream AHD. It allowed the sunlight to penetrate easily through the water and help the weeds grow abundantly. Also, the overuse of synthetic fertilizers has resulted in increasing the growth of weeds. Accordingly, more than 80 % of canals and 76 % of drains became infested with all kinds of aquatic weeds. The enormous increase of weeds led to several problems, such as obstruction of water flow and navigation, increase of water losses due to evapotranspiration, and difficulty of water arrival to canal ends.

Since Egypt is in a bad need of every drop of its water resources, many researches have been conducted to study the effect of these weeds on open channels. In this regard, this study was initiated with the aim of studying the effect of floating weeds on the hydraulic characteristics of open channels, such as water velocity distributions, heading up, discharge reduction, and roughness height coefficient of open channels infested with floating weeds.

To carry out this study, a trapezoidal flume cross section with a horizontal bed was used at the laboratory of the Channel Maintenance Research Institute (CMRI), Kanater El-Khiaria. The experiment was done by simulating the aquatic weeds with Foam strips having downward Aluminum fixed wires. These wires represent the roots of the floating weeds with different lengths (10, 6, 3 cm). They are kept 4 cm each apart in two directions. Three cases were studied namely; the smooth case (without vegetation), cases A & B (with vegetation). These cases were tried for three different root lengths(10, 6, 3 cm). For every case, different data were measured and collected, such as water depths, velocity distributions, water surface slopes, and horizontal and vertical distances.

Analyzing the collected experimental data, a number of relationships that explain the effects of floating weeds on the hydraulic characteristics of open channels were deduced. For instance, the effect of floating weeds on water surface slopes, velocity distributions longitudinally and transversely, discharge reduction, and roughness coefficient.

Finally, it was concluded that the presence of floating weeds increases the channel water surface slope, leads to a reduction in channel discharge, and changes the velocity distributions in the longitudinal and transverse directions. In addition, the heading up is a function of the vegetation length, the water slope is a function of the root length of vegetation, the main part of the flow is in the zone free from vegetation, the velocities reach their high values in the zones free from vegetation, and the velocity profile below vegetation can be represented by a logarithmic equation .