بسم الله الرحمن الرحيم

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بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

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INVESTIGATION OF DESIGN PARAMETERS AFFECTING WIND-DRIVEN CIRCULATION IN ARTIFICIAL LAKES

By

Mohamed Ahmed Saad Abuseree

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Irrigation and Hydraulics Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Investigation of Design Parameters Affecting Wind-Driven Circulation in Artificial Lakes

Key Words:
Artificial lakes; Lake hydrodynamics; Field measurements; Wind-driven circulation; Delft3D

Summary:

Artificial lakes' parameters are typically determined by urban planners without consideration for circulation. This research was developed to examine design parameters of artificial lakes in order to give design guidelines for artificial lake designers. Field measurements of bathymetry, flow velocities, and drifter tracks were collected from a case study in a residential compound (Lake Dream) and the data were analyzed and processed using MATLAB. A three-dimensional hydrodynamic numerical model was developed using Delft3D. The field data were used to calibrate the model and to demonstrate the considerable effect of sheltering. An idealized basin was developed to simplify the geometry and study the effect of different design parameters with and without wind sheltering effect. By studying different scenarios, it was concluded that, to enhance the horizontal circulation in artificial lakes, the maximum bed slope should be oriented perpendicular to the dominant wind direction with and without considering wind sheltering effect, the aspect ratio effect depends on bed slope, lake orientation and wind sheltering.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

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Signature:

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