بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

شبكة المعلومات الجامعية

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY

OPTIMAL SELECTION AND DESIGN OF SMALL HYDROPOWER PROJECTS

By

Hazem Usama Said Said Abdelhady

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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Under the Supervision of

Prof. Abdallah Sadik Bazaraa

- - - - - - - - - - - - - - - - - - - -

Professor of Irrigation and Drainage Engineering
Irrigation and Hydraulics Engineering Department
Faculty of Engineering , Cairo University

Dr. Yehya Emad Imam

- - - - - - - - - - - - - - - - - -

Lecturer
Irrigation and Hydraulics Engineering Department
Faculty of Engineering , Cairo University

Dr. Ziad Shawwash

- - - - - - - - - - - - - - - - - -

Assistant Professor
Department of Civil Engineering
Faculty of Applied Science, University of British Columbia, Vancouver, B.C., Canada

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Approved by the Examining Committee:

Prof. Abdallah Sadik Bazaraa, Thesis Main Advisor

Prof. Khaled Hussein Hamed, Internal Examiner

Prof. Anas Mohamed El Molla, External Examiner
(Professor of Hydraulics
Faculty of Engineering – Al Azhar University)

FACULTY OF ENGINEERING , CAIRO UNIVERSITY
GIZA, EGYPT
2020

Engineer's Name: Hazem Usama Said Said Abdelhady
Date of Birth: 29/3/1995
Nationality: Egyptian
E-mail: hazem.usama.said@cu.edu.eg
Phone: 01153199168
Address: 6 Dokki street, Giza
Registration Date: 10/10/2018
Awarding Date: –/–/20–
Degree: Master of Science
Department: Irrigation and Hydraulics Engineering

Supervisors:

Prof. Abdallah Sadik Bazaraa
Dr. Yehya Emad Imam
Dr. Ziad Shawwash
(University of British Columbia, Canda)

Examiners:

Prof. Abdallah Sadik Bazaraa (Thesis main advisor)
Prof. Khaled Hussein Hamed (Internal examiner)
Prof. Anas Mohamed El Molla (External examiner)
(Professor at Faculty of Engineering
Al Azhar University)

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OPTIMAL SELECTION AND DESIGN OF SMALL HYDROPOWER PROJECTS

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Summary:
The number of small hydropower projects (SHP) worldwide has grown multiple folds over the past few years. To support continued growth, reliable tools are needed for proper SHP selection and prioritization. A model was developed to identify optimal SHP along a given river reach based on a greedy genetic algorithm that maximizes net annual benefit. For each project, the model determines intake location, penstock diameter and length, and turbine number and capacity. Model performance was assessed through application to the Mamquam River in Canada and the Guder River in Ethiopia. The better performance of the optimization model in this study is attributed to the following model features: 1) the freedom to select intakes at any location along a river reach and not at specified intervals, and 2) the ability to select the appropriate number of turbines up to a specified maximum number. The model also runs efficiently and achieves relatively short runtimes by relying on separate optimization modules and parallel execution.

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.

Name: Hazem Usama Said Said Abdelhady
Signature:

Date: ..../.../2020

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