بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

EXTENDED ACTIVATED SLUDGE MODEL NO.1 WITH FLOC AND BIOFILM DIFFUSION FOR ORGANIC AND NUTRIENT REMOVAL

By

Ahmed Mahmoud Mohamed Al Madany

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY
in
Civil Engineering - Public Works

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

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Key Words:
Biofilm model; Chemical oxygen demand (COD); Flux diffusion; Modified ASM1; Monod kinetics.

Summary:

This thesis presents a modified mathematical model for substrate degradation and nutrient removal by aerobic microorganisms. The modified model is based on Activated Sludge Model No.1 (ASM1) for bacterial growth incorporated with substrate diffusion into flocs and biofilms. Monod kinetics are modified to consider the proton translocation theory for substrate dissociation in ASM1. Microbial growth rate coupled with mass transport rate was studied for heterotrophs and autotrophs in bulk solution and boundary layer of biofilm to reveal the extra degree of freedom of this dynamic model. Moreover, the sensitivity analysis of modified model was discussed at steady state using Newton Raphson technique.

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: Ahmed Mahmoud Mohamed Al Madany Date: 26/07/2020

Signature: Ahmed Madany

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“Then, to Allah belongs all praise - Lord of the heavens and Lord of the earth, Lord of the worlds”

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Table of Contents

List of Tables

List of Figures