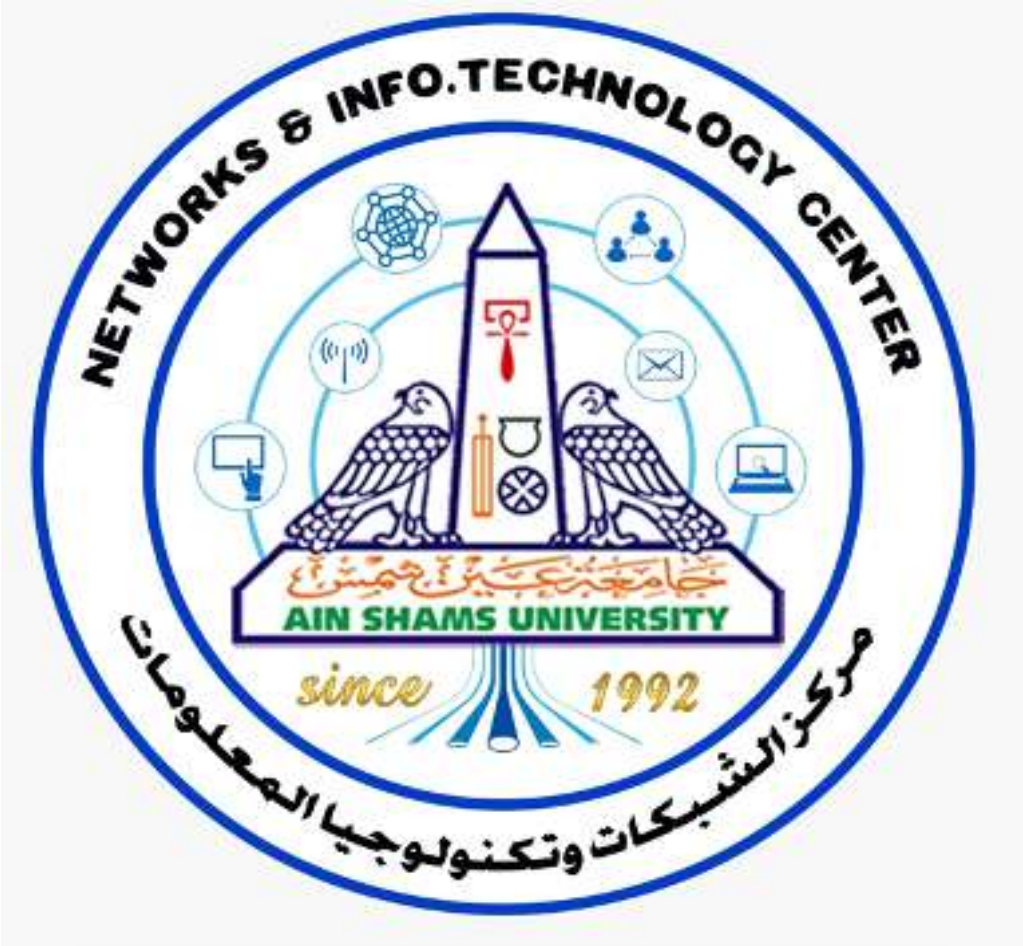
Mona Maghraby

بسم اللّه الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني



Mona Maghraby

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

EVALUATING THE PERFORMANCE OF MICROBIAL DESALINATION CELLS SUBJECTED TO DIFFERENT OPERATIONAL CONDITIONS

By

Mostafa Ragab Ibrahim

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
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in
Civil Engineering - Public Works

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of

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Approved by the
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Title of Thesis:
Evaluating the Performance of Microbial Desalination Cells Subjected to Different Operational Conditions

Key Words:
Desalination, substrate concentration; external resistance; temperature; SEM images

Summary:
Operational conditions have a tremendous effect on the performance of Microbial Desalination Cells (MDC). In this study, the MDCs performance was comprehensively investigated under three phases. In the first phase, the MDCs were tested at three different temperatures zones. The increase in temperature resulted in reduction in the internal resistance which improves the desalination. It was demonstrated that the MDCs are adaptable to function at different operation temperatures. In the second phase, the MDCs was tested under different substrate strengths. Operation of the MDC using high concentration substrate revealed higher internal resistance and lower performance due to the substrate inhibition effect. It was found that feeding the MDC with low to medium substrate concentration with continuous feeding at short batch cycle could achieve the best COD removal efficiency, CEs and voltage generation compared with operating the MDCs at high substrate concentration over long batch cycles. In the third phase, the MDCs the performance of MDCs was investigated concurrently under different substrate strengths and variable external resistances. The external resistance was found to have significant effect on COD removal and CEs. The desalination pattern of the MDCs tends to be very close to each other at high external resistances above due to limitations of electron flow regardless the substrate concentration.

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: Mostafa Ragab Date:

Signature:

Dedication

To my lovely family

Acknowledgments

I would like to give my sincere thanks to the support I have received from many individuals right from the beginning of my PhD program. First and foremost, I am grateful for the opportunity to work under the direction of my advisors, Prof. Hisham Abdel-halim and Dr. Abdelsalam A. Elawwad. I would like to thank them for the tremendous support, guidance, and insight they have offered me on my research work, and for the priceless advice on my career. I would also like to extend my thanks to the examining committee members for their advice and comments on my dissertation.

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