بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

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
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MONA MAGHRABY

EXPERIMENTAL ANALYSIS OF INDIRECT FREEZE DESALINATION WITH AND WITHOUT MAGNETIC FIELD EXPOSURE

By

Hebatallah Mohamed Shawky Elsayed Abdelmoaty

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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Title of Thesis:
Experimental Analysis of Indirect Freeze Desalination with and without Magnetic Field Exposure

Key Words:
Freeze Desalination; Supercooling; Magnetic Field; Salt Reduction; Magnetic Flux Intensity

Summary:
A comprehensive understanding of the influence of freeze desalination (FD) parameters on salt reduction is essential to increase the efficiency of the FD process. In this thesis, an experimental setup with a suspension freezing system has been utilized to quantify the weight of influence of different FD parameters on salt reduction through robust parametric analysis. Additionally, external magnetic fields (MF) is introduced to assess the effect of magnetic flux density, the configuration of electromagnets, and electric current type (AC and DC) on salt reduction. Without MF exposure, the results reveal that the rate of cooling below 12 C^{o} (R12^{-}) is the most influential parameter in the process. With MF exposure, the results indicate that (1) the intensity of MF should be compatible with the feed salinity, and (2) the percentage of salt reduction increases when the magnetic flux density and the Lorentz force increase.

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:

Acknowledgments

I would like to thank Faculty of Engineering- Cairo University for allocating some budget from the research affairs to conduct my master research study. I would like to thank my supervisors: Dr. Ahmad Wagdy and Dr. Abdelmomen Mahgoub for the continuous support throughout the different phases of my experimental thesis work. I would also like to acknowledge professors: Dr Alaa Elzawahry, Dr Ahmed Soliman, and Dr Mohamed Ammar for providing necessary knowledge for completing my thesis work. Additionally, I would like to thank the owners of the both Skimo and Open Air companies for customizing the experimental setup as the prepared design.

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Nomenclature

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Symbols:

$R12^-$	Rate of cooling below 12 C^o in C^o/min
Vol.	Volume of produced ice in L
C_i	Initial feed concentration in g/L
B	Magnetic field strength
dB/dx	Change of magnetic field strength with distance

Acronyms:

SR	Salt reduction (g/L)
FD	Freeze Desalination
MF	Magnetic Field
ED	Electro-dialysis
EDR	Electro-dialysis reversal
MED	Multi effect distillation
VCD	Vapor compression distillation
MSF	Multistage flash distillation
RO	Reverse Osmosis
MF	Microfiltration
UF	Ultrafiltration