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

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PERFORMANCE EVALUATION OF DIRECT AND INDIRECT ABSORPTION LINEAR FRESNEL REFLECTORS OPERATING WITH NANOFLUIDS

by

Ali Ashraf Omar Abdelkawi

A Thesis Submitted to the

Faculty of Engineering at Cairo University

in Partial Fulfillment of the

Requirement for the Degree of

MASTER OF SCIENCE

In

MECHANICAL POWER ENGINEERING

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis: Performance evaluation of direct and indirect absorption linear Fresnel reflectors operating with nanofluids

Keywords: solar energy, nanofluid, direct absorption, CFD simulations, linear Fresnel reflector.

Summary:

In this study, the performance of a linear Fresnel reflector (LFR) is analyzed using three types of nanofluids (Syltherm800-Cu, Therminol-Al_2O_3, and water-graphite) as heat transfer fluids with a range of volume fraction of 0.01% to 6%. A comparison between pure-fluids and nanofluids is conducted regarding thermal efficiency, exergy efficiency, pumping power, and heat transfer coefficient. Nanofluids have a consistently positive impact on the thermal performance of solar collectors which as thermal efficiency enhancement was 4% and 3.3% for a volume fraction of 6% in the case of Therminol-Al_2O_3 and Sylthem-Cu ,respectively. Regarding the heat transfer coefficient, a constant improvement in values was found when using nanofluids, it reached a maximum of 44% and 35% at a volume fraction of 6% for Therminol Al_2O_3 and Syltherm-Cu, respectively. With regards to the direct absorption technology, nanofluids show a marked increase in optical and thermal performance, compared to the base-fluid.

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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ACKNOWLEDGMENT

I would like to express my deepest sense of gratitude to my respectable supervisor; **Prof. Dr. Adel Khalil**; who offered me the honor to be one of his students. I would like to thank him for his continuous advice and encouragement, guidance, extreme caring, and great effort to provide me with an excellent atmosphere for doing this project. The door to his office was always open whenever I face trouble or seek support.

I would much like to thank **Dr. Muhammed A. Hassan** for his continuous help and support to complete this thesis. He consistently mentored me in the right direction whenever he thought I needed it. I would much appreciate his consistent availability any time I need him.

Finally, I must express my very profound gratitude to **Eng. Mohamed AbdelAzim, Mohamed Abu Bakr, and Mohamed Hafez Yehia** for providing me with unfailing support and continuous encouragement throughout my work and through the process of studying and writing this thesis. This accomplishment would not have been possible without them. Thank you.