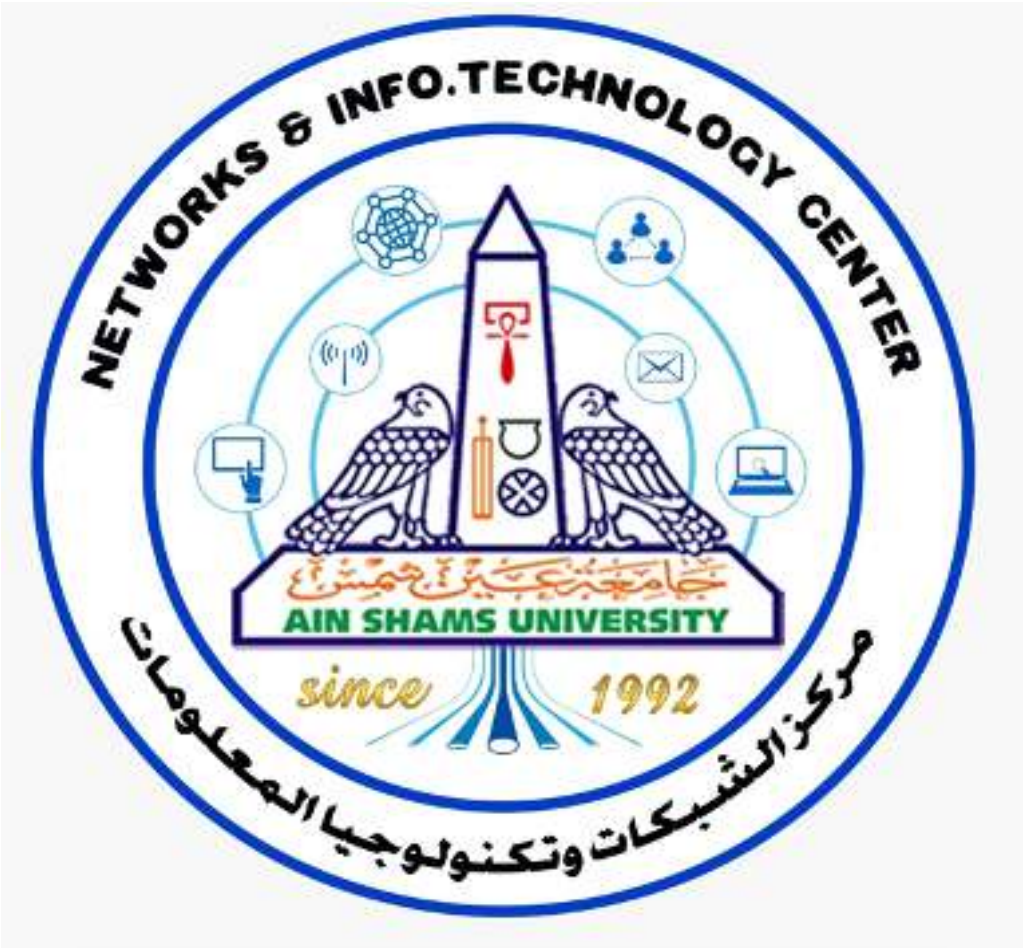
Safaa Mahmoud

بسم اللّه الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني



Safaa Mahmoud

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

Ain Shams University

Faculty of Engineering

Mechanical Power Department

Experimental Investigation of the Photovoltaic Performance using Porous Media based Cooling System

By

Eng. Maha Mohammed Mohammed Shata

A Thesis

Submitted in Partial Fulfillment of the Requirements for the

Degree of Master of Science

In the Mechanical Power Engineering

Under the supervision of

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August,2019

(Cairo-2019)

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Abstract

Cooling photovoltaic panels (PV) is considered as one of the most important ways to enhance its performance. Photons with wavelength above the threshold are converted into heat in the PV cells. The ambient temperature acts a key base in the photovoltaic conversion process, where it output power decreases with increasing its temperature than the ambient temperature. In this study, experiments are conducted to study the cooling effect of using a porous material on the electrical performance of a photovoltaic panel. The temperature of the surface of the PV panel is measured at the thirty-eight points without cooling and with cooling. It is found that the temperature decreases when compared to PV panel without cooling. The maximum decrease in the temperature is 9.8%. In addition, the electric current of the PV increases with cooling. The maximum increase of the cooling measured electric current is 16.4 % at a specific voltage, 19.6V. Furthermore, the maximum gain of the output power is about 15 %.

Moreover, a numerical work is carried out by ANSYS program on the thermal side. The results of the ANSYS program proved that the holes porous aluminum sheets achieved the cooling for the PV panel.

Key words: Cooling PV panel, Ambient Temperature, Porous Material, Electrical Power.

Dedication

First and foremost, I would like to dedicate this thesis to my father and my mother for working to install knowledge in me starting at the very early young age. I would like to thank all my family especially my husband and my children.

I would like to thank Prof.Dr. Mahmoud Kamal and Prof.Dr Mostafa Marei for giving me the great opportunity to work on this thesis project during my graduate studies.

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