OPTIMUM SIZING & MONITORING AND PERFORMANCE OF PHOTOVOLTAIC BASED WATER PUMPING SYSTEM

By

Eng. Amira Shaban Abd-ElMohsen Omer

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

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Summary:

In stand-alone pumping systems the incorporation of photovoltaic systems in water pumping applications is thought to be one of the most popular and ideal uses of solar energy exploitation, this is due to especially the common allegation of coincidence between insolation and water demand. This study intends to investigate and design a PV power system for water pumping application and develop an appropriate numerical algorithm properly adapted to analyzing a typical photovoltaic water pumping installation. Also, to provide the I-V and P-V characteristics for various insolation at constant temperature (T=25ºC) and different temperature values at constant insolation (1000W/m^2) by using MATLAB/ SIMULINK.

The present measurements are used to show how far the pv- power generation could be matched with load demands and battery state of charge. It also investigates the total efficiency of the installation and the water quantity pumped on a daily basis for a selected time period.

An economical study of the photovoltaic pumping system is carried out compared with a pump driven by a gasoline engine.

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DEDICATION

I dedicate this thesis to my father and mother who had always been my eternal source of encouragement for me. I also dedicate this work to my dear brothers Ahamed and Mohammad and my dear sisters Abeer and Shereen who always support and believe in me.

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