Ain Shams University
Faculty of Engineering

New Technique For Maximum Power Point Tracker On Photovoltaic Systems

By

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A Thesis Submitted for the Requirement of the Degree of
Master of Sciences in Electrical Power Engineering

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Statement

This dissertation is submitted to Ain Shams University in partial fulfillment of the requirements for the degree of Master of Sciences in Electrical Engineering.

The work included in the thesis was carried out by the author at the department of Electrical Power and Machines, Faculty of Engineering Ain Shams University.

No part of this thesis has been submitted for a degree or a qualification at any other university or institution.

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List of Symbols and Abbreviations

A	Diode quality factor
BFV	Best fixed voltage
C	Capacitor
CdS	Cadmium Sulphide
CdTe	Cadmium Telluride
CIGS	Copper Indium Gallium (di)selenide
CSI	Current source inverter
D	Duty cycle
DSP	Digital Signal Processor
ΔD	Duty ratio
E	Error in fuzzy controller
EVA	Ethylene Vinyl acetate
ΔE	Error ratio
FF	Fill Factor
G	Irradiance
GaAs	Gallium Arsenide
I	Solar cell current
I_d	Diode current
IC	Incremental conductance
IGBT	Insulated-gate bipolar transistor
I_L	Light generated current
I_{LB}	Inductor boundary current
I_O	Diode saturation current
I_{OB}	Output boundary current
I_{MPP}	Current at MPP
I_{ph}	photon generated current
K	Boltzman constant (1.38×10^{-23} J/K)
K_1	Constant depending on the characteristics of photovoltaic array
K_2	Coefficient of proportionality
L	Inductor
LRCM	Linear reoriented coordinates method
LCD	Liquid Crystal Display

MF	Membership Function
MPP	Maximum power point
MPPT	Maximum power point tracker
NN	Neural Network
n_p	Number of parallel solar cells
n_s	Number of series solar cells
OCC	One-cycle control
P	Power
P&O	Perturb and Observation
PVF	Polyvinyl Fluoride
PVG	Photovoltaic generator
PWM	Pulse width modulation
q	Electron charge (1.6×10-19 C)
RCC	Ripple correlation control
Ri	Input resistance of converter
Ro	Output resistance of converter
Rs	Solar cell series resistance (Ω)
Rsh	Solar cell shunt resistance (Ω)
S	Insolation
STC	Standard Test Conditions
T	Cell temperature in Kelvin (K)
u	Switching function of converter
V_O	Solar cell output voltage (V)
V_{MPP}	Voltage at MPP
VSI	Voltage source inverter
V_{link}	Voltage across the dc link
V_{OC}	Open circuit voltage
ΔV	Perturbation of Voltage
V_i	Input voltage of converter
$V_{reference}$	Voltage of module

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