



Ain Shams University
Faculty of Engineering

**New Technique For Maximum Power Point
Tracker On Photovoltaic Systems**

By

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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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Table of Contents

LIST OF SYMBOLS AND ABBREVIATIONS	VII
ABSTRACT	XIV
CHAPTER(1) INTRODUCTION	1
1.1 History of PV	1
1.2 An Overview	1
1.3 Background	4
1.4 Motivation	5
1.5 Objectives	6
1.6 Thesis outline	6
CHAPTER(2) LITERATURE REVIEW	8
2.1 Maximum power point tracker Algorithms	8
2.2 How maximum power point is obtained	9
2.3 Main Aspect of MPPT Techniques	10
2.3.1 Implementation	11
2.3.2 Sensors	11
2.3.3 Multiple Local Maxima	11
2.3.4 Costs	12
2.3.5 Applications of MPPTs	12
2.4 Methods of Peak Power Tracking	14
2.5 More details about the Techniques	15
2.5.1 Hill-Climbing Techniques	16
2.5.1.1 Perturb and observe	16
2.5.1.2 Incremental conductance	18
2.5.1.3 Other "hill climbing" MPPT methods	23
2.5.2 Fuzzy Logic Control	24
2.5.3 Neural Network	27
2.5.4 Fractional Open-Circuit Voltage	28
2.5.5 Fractional Short-Circuit Current	29
2.5.6 Current Sweep	30
2.5.7 DC-Link Capacitor Droop Control	31
2.5.8 Load Current or Load Voltage Maximization	32
2.5.9 dP/dV or dP/dI Feedback Control	33

2.5.10 Other MPPT Techniques	34
2.6 Major characteristics of MPPT Techniques	37
2.7 DC-DC Converter	38
2.7.1 Switching Converter Topologies	39
2.7.2 Non-Isolated Switching Converters	39
2.7.2.1 Buck Converter (step-down converter)	40
2.7.2.2 Boost Converter (step-up converter)	43
2.7.2.3 Buck-Boost Converter (step-up/step-down)	46
2.7.2.4 Cuk Converter(step-up/step-down converter)	48
CHAPTER(3) PHOTOVOLTAIC MODELING	53
3.1 Solar Cells	53
3.2 Operating principle	54
3.3 Equivalent circuit of a solar cell	56
3.4 Open circuit voltage, short circuit current and MPP	57
3.5 Fill Factor	58
3.6 Temperature and irradiance effects	59
3.7 Types of Solar cells	62
3.7.1 Monocrystalline silicon	64
3.7.2 Polycrystalline silicon	64
3.7.3 Amorphous and thin film silicon	65
3.7.4 Other cells and materials	66
3.8 Photovoltaic modules	67
3.9 Applications of PV systems	68
CHAPTER(4) IMPLEMENTATION OF P&O USING	70
BUCK AND BUCK-BOOST CONVERTERS	
4.1 Introduction	70
4.2 PV module	72
4.3 DC-DC Converter	73
4.4 Problem Overview	74
4.5 MPPT Control Algorithm	74
4.5.1 Perturb and Observe(P&O)	75
4.5.2 Incremental Conductance(IC)	76
4.6 Matlab/Simulink Environment	77
4.7 Result and Simulation	82

4.7.1 Buck Converter Simulation With Perturb and Observe Controller	82
4.7.2 Buck-Boost Converter Simulation With Perturb And Observe Controller	84
CHAPTER(5) IMPLEMENTATION &COMPARATIVE OF P&O AND IC USING BUCK CONVERTER	88
5.1 Introduction	88
5.2 Photovoltaic Module	89
5.3 DC-DC Converter Analysis	89
5.3.1 Buck Converter	89
5.4 Problem Overview	90
5.5 MPPT Control Algorithm	90
5.5.1 Incremental Conductance(IC)	91
5.6 MATLAB-SIMULINK Environment	94
5.7 Results and Simulation	98
5.7.1 Buck Converter Simulation With Perturb and Observe Controller	98
5.7.2 Buck Converter Simulation With Incremental Conductance	100
CHAPTER(6) MODELING AND SIMULATION OF THREE-PHASE TWO-STAGE GRID CONNECTED PHOTOVOLTAIC SYSTEM	103
6.1 Introduction	103
6.2 PV Generator Model	104
6.3 Model of Boost DC-DC Converter	105
6.4 Inverter Modeling	106
6.5 Control of Grid Connected of PV System	106
6.5.1 MPPT Control	108
6.5.2 Inverter Control	109
6.5.2.1 Inverters Commutated	109
6.6 Matlab-Simulink Environment	110
6.7 Result and Simulation	114
CHAPTER (7) CONCLSIONS AND FUTURE SCOPE	120
7.1 Conclusion	120
7.2 Future scope	121

REFERENCES	122
LIST OF PUBLICATIONS	131

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
R_i	Input resistance of converter
R_o	Output resistance of converter
R_s	Solar cell series resistance (Ω)
R_{sh}	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

List of Figures

Fig.(1.1)	(a) I-V characteristics Curve	4
Fig.(1.1)	(b)PV panel MPP	5
Fig.(2.1)	Block diagram of a typical MPPT System.	9
Fig.(2.2)	DC/DC converter helps in tracking the peak power point.	10
Fig.(2.3)	Battery charging application of MPPT	13
Fig.(2.4)	Grid connected application using MPPT	14
Fig.(2.5)	Pumping application of the MPPT	14
Fig.(2.6)	PV Panel characteristics curves	17
Fig.(2.7)	The Flowchart of the (P&O) algorithm	18
Fig.(2.8)	The Flowchart of the (IC) algorithm	18
Fig.(2.9)	P-V Curve depending on the irradiation	20
Fig.(2.10)	A fuzzy Membership functions	25
Fig.(2.11)	Neural network layers	27
Fig.(2.12)	Topology for DC-link capacitor droop control	32
Fig.(2.13)	Different load types1: voltage source, 2 resistive, 3: resistive and voltage source, 4: current source.	33
Fig.(2.14)	Characteristic PV array power curve.	34
Fig.(2.15)	Ideal switch voltage $v_s(t)$, duty ratio D, and switching period T_s	38
Fig.(2.16)	Buck converter circuit	40
Fig.(2.17)	Inductor voltage , current and output voltage in a buck converter	42
Fig.(2.18)	Boost converter circuit	43
Fig.(2.19)	Inductor voltage , current and output voltage in a boost converter	45
Fig.(2.20)	Circuit of the buck-boost converter	46
Fig.(2.21)	Inductor voltage , current and output voltage in a boost converter	47
Fig.(2.22)	Circuit of the cuk converter	49

Fig.(2.23)	Cuk converter with (a) switch ON and (b) swit-OFF	50
Fig.(3.1)	Photovoltaic technology	53
Fig.(3.2)	Solar Cell	55
Fig.(3.3)	Equivalent circuit of Solar Cell	56
Fig.(3.4)	Important point in the characteristic curves of a solar panel	58
Fig.(3.5)	(V-I) and (V-P) curves at constant temperature (25^0) and three different insolation values	60
Fig.(3.6)(a)	(V-I) at constant insolation (1000 W/m^2) for three different temperatures	61
Fig.(3.6)(b)	(V-P) curves at constant insolation (1000 W/m^2) for three different temperatures	62
Fig. (3.7)	Types of solar cell	62
Fig. (3.8)	Monocrystalline Solar Panels	64
Fig. (3.9)	Polycrystalline Solar Panels.	65
Fig. (3.10)	PV Module typical construction	67
Fig. (3.11)	Diagram of PV application	69
Fig.(4.1)	DC-DC Converter for operation at the MPPT	72
Fig.(4.2)	Equivalent electrical circuit of a Solar Cell	73
Fig.(4.3(a))	Graph power versus voltage for perturb and observe algorithm	75
Fig.(4.3(b))	Flowchart perturb and observe algorithm	76
Fig.(4.4)	Block Diagram of a PV array connected to the load	77
Fig.(4.5)	Simulink model of the PV panel	78
Fig.(4.6)	Simulink model of buck converter	79
Fig.(4.7)	Simulink model of buck-boost converter	79
Fig.(4.8)	Simulink model for P&O Algorithm	80
Fig.(4.9)	Simulink model of buck converter and	81

	P&O MPPT	
Fig.(4.10)	Simulink model of buck-boost converter and P&O MPPT	82
Fig.(4.11)	Output current, voltage and power of PV panel(PV connected to the buck)	83
Fig.(4.12)	Output current, voltage and power of Buck converter with P&O algorithm	84
Fig.(4.13)	Output current, voltage and power of PV panel(PV connected to the buck-boost)	85
Fig. (4.14)	Output current, voltage and power of Buck-boost converter with P&O algorithm	86
Fig.(5.1)	Sign of the dp/dv at different positions on the P-V characteristic curve of a PV array	92
Fig.(5.2)	Flowchart (IC) algorithm	93
Fig.(5.3)	DC-DC Converter for operation at MPPT	94
Fig.(5.4)	Simulink Block diagram of the PV panel connected to the load	95
Fig.(5.5)	Simulink model of buck converter	95
Fig.(5.6)	Simulink model of P&O Algorithm	96
Fig.(5.7)	Simulink model of IC Algorithm	97
Fig.(5.8)	Simulink model of buck converter and P&O MPPT	97
Fig.(5.9)	Simulink model of buck converter and IC MPPT	98
Fig.(5.10)	Output current, voltage and power of PV panel with (P&O) MPPT algorithm	99
Fig.(5.11)	Output current, voltage and power of buck converter with (P&O) MPPT	100
Fig.(5.12)	Output current, voltage and power of PV panel with (IC) MPPT	100
Fig.(5.13)	Output current, voltage and power of buck converter with (IC) MPPT	101
Fig. (6.1)	Two stage-grid connected PV blocks scheme	104
Fig. (6.2)	Boost converter circuit	105

Fig. (6.3)	Simulink model of PV panel	111
Fig. (6.4)	Simulink model of boost converter	111
Fig. (6.5)	Simulink model of P&O Algorithm	112
Fig. (6.6)	Simulink® model of Inverter & LC filter and RL Load	113
Fig.(6.7)	Simulink® model of complete photovolt - aic grid connected	114
Fig.(6.8)	PV output voltage, DC/DC converter O/P current and DC/DC converter O/P voltage	115
Fig.(6.9)	Total harmonic distortion(THD) before filtering	116
Fig.(6.10)	Total harmonic distortion(THD) after filtering	116
Fig.(6.11)	Vabc (three phase voltage) between filter and grid	117
Fig.(6.12)	Vabc & Iabc (three phase voltage and three phase current) of Grid	118
Fig.(6.13)	Vabc (three phase voltage) of load	119