

การเปรียบเทียบกระแสความผิดพ่วงระหว่างระบบเซลล์แสงอาทิตย์แบบเชื่อมต่อกับระบบ
และเครื่องกำเนิดไฟฟ้าเชิงโคโรน่าแบบกระจายในระบบจำหน่าย



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COMPARISON OF FAULT CURRENT LEVELS BETWEEN GRID-CONNECTED PHOTOVOLTAIC
SYSTEM AND SYNCHRONOUS MACHINE DISTRIBUTED GENERATION IN A DISTRIBUTION SYSTEM

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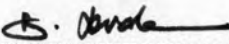
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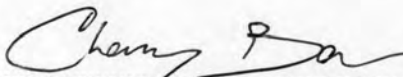
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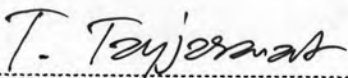
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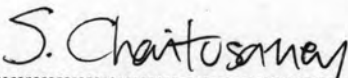
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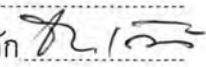
อ.ที่ปรึกษาวิทยานิพนธ์หลัก : อ.ดร.ธวัชชัย เตชัสอนันต์, 80หน้า.

วิทยานิพนธ์เล่มนี้ นำเสนอการเปรียบเทียบระดับกระแสความผิดพลาด ระหว่างระบบจ่าย
พลังงานไฟฟ้าด้วยแสงอาทิตย์แบบเชื่อมต่อกับกริด (GCPV) และระบบจ่ายพลังงานไฟฟ้าจากเครื่อง
กำเนิดไฟฟ้าซิงโครนัสแบบกระจาย (SG) โดยแสดงให้เห็นผลกระทบจากกรณีที่มีการติดตั้งระบบ
จ่ายพลังงานไฟฟ้าทั้งสองแบบนี้ในระบบจำหน่ายไฟฟ้าขนาด 23 บัส 65MVA_{sc} ที่แรงดัน 22 kV
ซึ่งมีโหลดรวมทั้งสิ้น 700 kW แบบจำลองของระบบ GCPV ประกอบด้วยแบบจำลองของเซลล์
แสงอาทิตย์ที่สามารถอธิบายได้ด้วยสมการของช็อคกีไดโอดซึ่งมีความต้านทานต่ออนุกรมอยู่
รวมถึงวงจรแปลงผันแรงดันแบบขยายซึ่งทำหน้าที่ในการหาค่ากำลังงานสูงสุด และอินเวอร์เตอร์
แบบพัลส์วidthมอดูเลชันซึ่งทำหน้าที่รักษาระดับแรงดัน เหตุการณ์จำลองเชิงเวลาทั้งหมดจะถูก
ทดสอบด้วยโปรแกรม MATLAB-SIMULINK โดยการปรับให้มีระดับการกระจายของกำลังไฟฟ้า
เมื่อเทียบกับโหลดได้หลายระดับทั้งระบบ GCPV และ SG ในตำแหน่งต่างๆ ของระบบ ทั้งนี้จะ
สมมติให้เกิดความผิดพลาดในหลายๆตำแหน่ง เพื่อประเมินกระแสความผิดพลาดสนับสนุนจาก
ระบบ GCPV ไปยังระบบหลัก โดยทำการเปรียบเทียบกับกระแสผิดพลาดสนับสนุนจากระบบ SG
ซึ่งจะได้วิเคราะห์และแสดงให้เห็นผลการเปรียบเทียบด้วย นอกจากนี้ ยังได้พิจารณาผลกระทบของ
กระแสผิดพลาดสนับสนุนที่มีต่อความสัมพันธ์ในการทำงานของอุปกรณ์ป้องกัน โดยใช้หลักเกณฑ์
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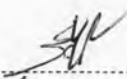
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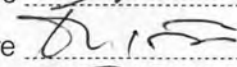
SEIHAKKIRY RANN : COMPARISON OF FAULT CURRENT LEVELS BETWEEN GRID-CONNECTED PHOTOVOLTAIC SYSTEM AND SYNCHRONOUS MACHINE DISTRIBUTED GENERATION IN A DISTRIBUTION SYSTEM. THESIS ADVISOR : THAVATCHAI TAYJASANANT, Ph.D., 80 pp.

This thesis presents the comparison of fault current levels between grid-connected photovoltaic (GCPV) system and synchronous machine distributed generator (SG). Their impacts are studied using 23-bus, 65MVA_{sc}, 23kV distribution system with the total load of 700W. Modeling of the GCPV is based on a PV model described by Shockley diode equation with a series resistance, a boost converter with maximum power point tracking (MPPT) technique, and a pulse width modulation (PWM) inverter with a voltage regulator. The simulation is carried out using the MATLAB-SIMULINK. Both GCPV and SG with various penetration levels are installed at various buses in the system. Various fault positions are assumed in order to assess the fault current contribution from the GCPV system to the main grid by comparing with the fault current contribution from the SG. Result comparison between the system with GCPV installation and SG installation is discussed. Impacts of fault current contribution on protection coordination are considered based on IEEE Std C37.112-1996.

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T. Tayjasanant

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CONTENTS

	Page
ABSTRACT (THAI)	iv
ABSTRACT (ENGLISH)	v
ACKNOWLEDGEMENTS	vi
CONTENTS	vii
LIST OF TABLES	ix
LIST OF FIGURES	xi
CHAPTER I INTRODUCTION	1
1.1 Motivation.....	1
1.2 Research Objectives.....	1
1.3 Scope of Study.....	1
1.4 Research Methodology	2
1.5 Research Outcomes	2
CHAPTER II LITERATURE REVIEW	4
2.1 Introduction.....	4
2.2 Photovoltaic Cell	4
2.2.1 Semiconductor Physics	5
2.2.2 Photovoltaic Characteristic	7
2.2.3 Photovoltaic Module and Array	11
2.3 Grid-Connected Photovoltaic Systems	13
2.3.1 Boost Converter	13
2.3.2 Maximum Power Point Tracking.....	17
2.3.3 PWM Inverter	18
2.3.4 Voltage Regulator	24
2.4 Synchronous Machine Distributed Generation.....	25
CHAPTER III MODELING OF GRID-CONNECTED PHOTOVOLTAIC SYSTEM	27
3.1 Photovoltaic Modeling.....	27
3.2 Implementation in MATLAB-SIMULINK	30

CHAPTER IV FAULT CURRENT ANALYSIS.....	42
4.1 Fault Current Calculation	42
4.2 Simulation Results and Discussions.....	43
4.3 Summary	62
CHAPTER V IMPACTS ON PROTECTION COORDINATION.....	63
5.1 Characteristics of Protection Devices.....	63
5.2 Results and Discussions	65
5.3 Summary	70
CHAPTER VI CONCLUSION.....	71
6.1 Conclusion.....	71
6.2 Future Work	71
REFERENCES....	72
APPENDIX.....	75
BIOGRAPHY.....	80

LIST OF TABLES

		Page
Table 3-1	80W Sharp PV parameter.....	32
Table 3-2	Comparison result of PV model simulation via I-V checker MP-140.....	35
Table 4-1	Fault current contribution results when 3 GCPV systems are installed	47
Table 4-2	Fault current contribution results when 3 SGs are installed.....	47
Table 4-3	Fault current contribution results when one GCPV system is installed at bus 201	49
Table 4-4	Fault current contribution results when one SG is installed at bus 201	49
Table 4-5	Fault current contribution results when one GCPV system is installed at bus 211	51
Table 4-6	Fault current contribution results when one SG is installed at bus 211	51
Table 4-7	Fault current contribution results when one GCPV system is installed at bus 218.....	53
Table 4-8	Fault current contribution results when one SG is installed at bus 218.....	53
Table 4-9	SLGF current contribution results when 3 GCPV systems are installed	55
Table 4-10	SLGF current contribution results when 3 SGs are installed.....	55
Table 4-11	SLGF current contribution results when one GCPV system is installed at bus 201.....	56
Table 4-12	SLGF current contribution results when one SG is installed at bus 201	57
Table 4-13	SLGF current contribution results when one GCPV system is installed at bus 211	58
Table 4-14	SLGF current contribution results when one SG is installed at bus 211	59

Table 4-15	SLGF current contribution results when one GCPV system is installed at bus 218.....	60
Table 4-16	SLGF current contribution results when one SG is installed at bus 218.....	60
Table 5-1	Protection coordination scheme in the presence of DG.....	69

LIST OF FIGURES

		Page
Figure 2-1	Average daily solar radiation in kW/h/m ²	4
Figure 2-2	Basic structure of silicon PV Cell	5
Figure 2-3	Physics of Silicon	6
Figure 2-4	N-Type Semiconductor, Silicon (Si) doped with Phosphorus (P), and P-Type Semiconductor, Silicon (Si) doped with Boron (B).....	6
Figure 2-5	Electrical current created by the electron flowing	7
Figure 2-6	Simple equivalent circuit for PV cell	7
Figure 2-7	Curve of current–voltage relationship for a PV cell.....	9
Figure 2-8	Modification of PV equivalent circuit by adding parallel or series resistance	9
Figure 2-9	Curve of I-V characteristic of a PV cell by adding parallel resistance	10
Figure 2-10	Curve of I-V characteristic of a PV cell by adding series resistance ...	10
Figure 2-11	Curve of I-V characteristic by wiring in series and in parallels.....	11
Figure 2-12	PV cell, module, and array	12
Figure 2-13	Shading with and without bypass diodes	12
Figure 2-14	Boost converter diagram	13
Figure 2-15	Continuous-conduction mode: (a) On-state, (b) Off-state	14
Figure 2-16	Boost converter at the boundary of continuous-discontinuous conduction	15
Figure 2-17	Boost converter waveform: (a) at boundary of continuous- discontinuous conduction, (b) at discontinuous conduction	16
Figure 2-18	P&O MPPT flowchart.....	18
Figure 2-19	Full-bridge dc-dc converter	19
Figure 2-20	PWM with bipolar voltage switching.....	19
Figure 2-21	One-leg switch-mode inverter	20
Figure 2-22	Pulse-width modulation (PWM)	21
Figure 2-23	Sinusoidal PWM	22
Figure 2-24	Three-phase PWM waveforms and harmonic spectrum	23
Figure 2-25	Voltage regulator diagram.....	24

Figure 2-26	Synchronous machine in MATLAB-SIMULINK	26
Figure 3-1	The equivalent circuit of the PV cell model	27
Figure 3-2	Implementation of PV characteristic modeling in SIMULINK.....	31
Figure 3-3	PV characteristic modeling forming in block diagram	31
Figure 3-4	I-V characteristic with constant ambient temperature and various irradiances	32
Figure 3-5	P-V characteristic with constant ambient temperature and various irradiances	33
Figure 3-6	I-V characteristic with constant irradiance and various ambient temperatures	33
Figure 3-7	P-V characteristic with constant irradiance and various ambient temperatures	33
Figure 3-8	P-V characteristic with various ambient temperatures	34
Figure 3-9	I-V and P-V characteristic with $G_a=600.6 \text{ W/m}^2$, and $T_a=30.91 \text{ }^\circ\text{C}$..	35
Figure 3-10	I-V characteristic with $G_a=600.6 \text{ W/m}^2$, and $T_a=30.91 \text{ }^\circ\text{C}$	36
Figure 3-11	P-V characteristic with $G_a=600.6 \text{ W/m}^2$, and $T_a=30.91 \text{ }^\circ\text{C}$	36
Figure 3-12	Boost converter diagram in SIMULINK	36
Figure 3-13	P&O MPPT algorithm in SIMULINK.....	37
Figure 3-14	Voltage regulator in SIMULINK.....	37
Figure 3-15	23-bus distribution system in Thailand.....	38
Figure 3-16	Modeling Grid-Connected PV in MATLAB-SIMULINK	38
Figure 3-17	Output voltage of the PV array	39
Figure 3-18	Output current of the PV array.....	39
Figure 3-19	Output voltage of the inverter with the load change at $t=0.15\text{s}$	40
Figure 3-20	Output current of the inverter with the load change at $t=0.15\text{s}$	40
Figure 3-21	Output power of PV and inverter with the load change at $t=0.15\text{s}$	40
Figure 3-22	Duty cycle from MPPT controlled.....	41
Figure 3-23	Modulation index (m_a) of the inverter with the load change at $t=0.15\text{s}$	41
Figure 4-1	23 bus distribution system with DG installation.....	44
Figure 4-2	Igrid and Ifault when fault assumes at bus 202.....	45
Figure 4-3	Igrid when fault assumes at bus 202, 212, and 217 respectively	45
Figure 4-4	Ifault at bus 202, 212, and 217 respectively	46

Figure 4-5	Igrid, Ipv, and Ifault when 3 GCPVs are installed and fault assumes at bus 202.....	46
Figure 4-6	Igrid, Isg, and Ifault when 3 SGs are installed and fault assumes at bus 202	46
Figure 4-7	Fault current comparison with and without 3GCPVs installation	47
Figure 4-8	Fault current comparison with and without 3SGs installation.....	48
Figure 4-9	Fault current comparison between 3 GCPVs and 3 SGs installation...	48
Figure 4-10	Fault current comparison with and without GCPV installation at bus 201	49
Figure 4-11	Fault current comparison with and without SG installation at bus 201.....	50
Figure 4-12	Fault current comparison between one GCPV or one SG installation at bus 201	50
Figure 4-13	Fault current comparison with and without GCPV installation at bus 211	51
Figure 4-14	Fault current comparison with and without SG installation at bus 211.....	52
Figure 4-15	Fault current comparison between one GCPV or one SG installation at bus 211	52
Figure 4-16	Fault current comparison with and without GCPV installation at bus 218	53
Figure 4-17	Fault current comparison with and without SG installation at bus 218.....	54
Figure 4-18	Fault current comparison between one GCPV or one SG installation at bus 218	54
Figure 4-19	SLGF current comparison with and without 3 GCPV installations.....	55
Figure 4-20	SLGF current comparison with and without 3 SG installations	56
Figure 4-21	SLGF current comparison between 3 GCPVs and 3 SGs installation.....	56
Figure 4-22	SLGF current comparison with and without GCPV installation at bus 201	57
Figure 4-23	SLGF current comparison with and without SG installation at bus 201.....	57

Figure 4-24	SLGF current comparison between one GCPV or one SG installation at bus 201	58
Figure 4-25	SLGF current comparison with and without GCPV installation at bus 211	58
Figure 4-26	SLGF current comparison with and without SG installation at bus 211.....	59
Figure 4-27	SLGF current comparison between one GCPV or one SG installation at bus 211	59
Figure 4-28	SLGF current comparison with and without GCPV installation at bus 218	60
Figure 4-29	SLGF current comparison with and without SG installation at bus 218.....	61
Figure 4-30	SLGF current comparison between one GCPV or one SG installation at bus 218	61
Figure 5-1	Protection coordination in the system.....	64
Figure 5-2	Protection coordination scheme.....	64
Figure 5-3	Protection coordination without DG installation when fault occurs at bus 202	65
Figure 5-4	Protection coordination without DG installation when fault occurs at bus 212	66
Figure 5-5	Protection coordination without DG installation when fault occurs at bus 217	66
Figure 5-6	Protection coordination when 3GCPVs installed and fault occurs at bus 217.....	67
Figure 5-7	Protection coordination when 3SGs installed and fault occurs at bus 217	67
Figure 5-8	Protection coordination when one GCPV is installed at bus 201 and fault occurs at bus 217.....	68
Figure 5-9	Protection coordination when one SG is installed at bus 201 and fault occurs at bus 217	68
Figure 5-10	Protection coordination when one GCPV is installed at bus 211 and fault occurs at bus 217.....	69