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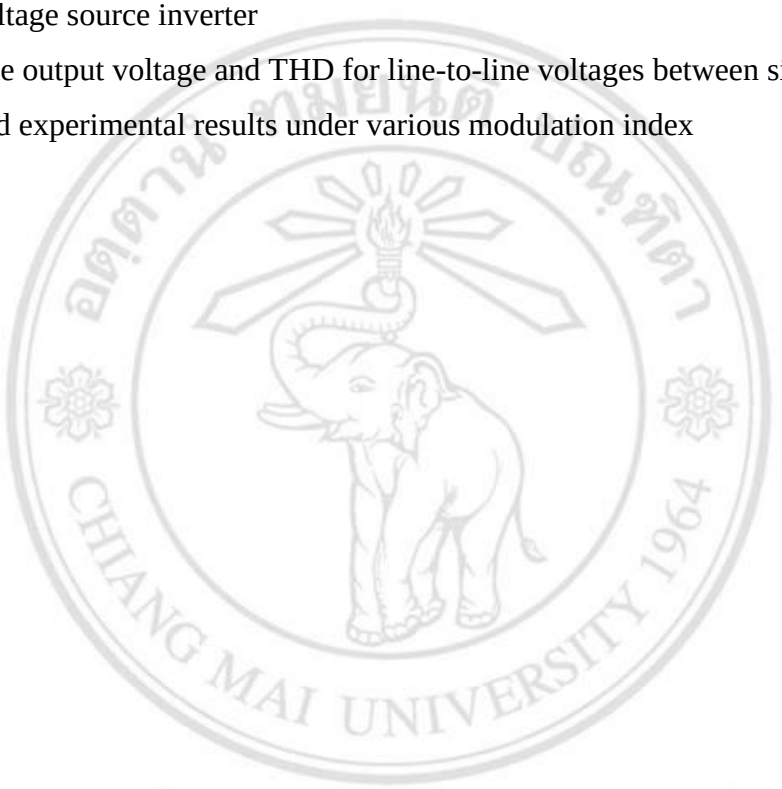

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LIST OF ABBREVATIONS

CB-PWM	Carrier-Based Pulsewidth Modulation
DFIG	Double-Fed Induction Generator
DPC	Direct Power Control
DSP	Digital Signal Processing
DTC	Direct Torque Control
EGAT	Electricity Generating Authority of Thailand
EMC	Electromagnetic Compatibility
FOC	Field-Oriented Control
GUI	Graphical User Interface
IGBT	Insulated-Gate Bipolar Transistor
MRAS	Model Reference Adaptive System
NPC	Neutral Point Clamped
PI	Proportional-Integral Controller
PMSG	Permanent Magnet Synchronous Generator
PMSM	Permanent Magnet Synchronous Motor
PWM	Pulsewidth Modulation
SCIG	Squirrel Cage Induction Generator
SPWM	Sinusoidal Pulsewidth Modulation
SVM	Space Vector Modulation
THD	Total Harmonic Distortion
VSC	Voltage Source Converter
VSI	Voltage Source Inverter
WRIM	Wound Rotor Induction Generator
WRSG	Wound Rotor Synchronous Generator

LIST OF SYMBOLS

PE	potential energy
g	acceleration of gravity
H_A	available head
H_E	effective head
P_A	available power of the hydro
η_g	efficiency of the generator
η_t	efficiency of turbine
η	efficiency of the generator
η_{hydro}	hydraulic turbine efficiency
ρ	density of the water
Q	flow rate of the water
P_{hydro}	electric power of the hydraulic power
$P_{m,hydro}$	mechanical hydraulic power
m_a	modulation index
v_A^*, v_B^*, v_C^*	three-phase sinusoidal reference voltages
v_0^*	zero-sequence voltage
$v_{A,0}^*, v_{B,0}^*, v_{C,0}^*$	non-sinusoidal three-phase reference voltages
$v_{A,M}^*, v_{B,M}^*, v_{C,M}^*$	modified reference voltages
$v_{AP}^*, v_{BP}^*, v_{CP}^*$	positive reference voltages
$v_{AN}^*, v_{BN}^*, v_{CN}^*$	negative reference voltages
v_{AZ}, v_{BZ}, v_{CZ}	pole voltages
v_{AB}, v_{BC}, v_{CA}	line-to-line voltages
v_{An}, v_{Bn}, v_{Cn}	phase-to-neutral voltages
V_d, V_{dc}	dc-link voltage

$\omega_s t$	inverter electrical position
f_1	fundamental frequency
d_A, d_B, d_C	duty cycles
d_{AP}, d_{BP}, d_{CP}	positive duty cycles
d_{AN}, d_{BN}, d_{CN}	negative duty cycles
s, r	stator and rotor indices
d, q	direct and quadrate indices for orthogonal components
d / dt	differential operation
$v_{sd}, v_{sq}, v_{rd}, v_{rq}$	direct and quadrate stator and rotor voltages
$i_{sd}, i_{sq}, i_{rd}, i_{rq}$	direct and quadrate stator and rotor currents
$\lambda_{sd}, \lambda_{sq}, \lambda_{rd}, \lambda_{rq}$	direct and quadrate stator and rotor flux linkages
R_s, R_r	stator and rotor phase resistances
ω_s	synchronous angular speed
ω_r	rotor angular speed
ω_{sl}	slip angular speed
L_s	stator phase inductance
L_r	rotor phase inductance
L_m	magnetizing phase inductance
T_e	electromagnetic torque
p_p	number of pole pairs
P_s, Q_s	stator active and reactive powers
P_r, Q_r	rotor active and reactive powers
P_g	grid-side active power
P_t	total active power
s	slip
θ_s	stator flux vector position

ข้อความแห่งการริเริ่ม

วิทยานิพนธ์นี้ได้นำเสนอหลักการควบคุมเครื่องกำเนิดไฟฟ้าเหนี่ยวนำแบบป้อนสองทางโดยใช้คอนเวอร์เตอร์สามระดับชนิดตึงจุดนิวตรัลแบบหันหลังชนกันสำหรับประยุกต์ใช้ในเครื่องกังหันน้ำขนาดเล็ก นอกจากนี้ยังได้นำเสนอการดัดแปลงวิธีการสร้างสัญญาณมอดูเลตแบบไม่ต่อเนื่องรูปแบบใหม่สำหรับคอนเวอร์เตอร์สามระดับชนิดตรึงจุดนิวตรัล

STATEMENT OF ORIGINALITY

A control strategy of the doubly-fed induction generator system using the back-to-back three-level neutral point clamped voltage source converter for small hydro turbine application has been proposed. A modified unipolar carrier-based pulsewidth modulation algorithm for the three-level neutral point clamped voltage source converter has been proposed.