SINGLE-PHASE FULL BRIDGE INVERTER USING SINUSOIDAL PULSE WIDTH MODULATION (SPWM) SWITCHING TECHNIQUE

This thesis is presented in partial fulfilment for the award of the Bachelor of Electrical Engineering (Honours)

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JULY 2012

ACKNOWLEDGEMENT

With the name of Allah, The Most Gracious and Merciful, Praise to Allah Almighty for giving me the will and strength to complete this final year project report successfully.

First and foremost, I would like to express my deepest gratitude and appreciation to my respected supervisor, ***En.Rahimi Baharom*** for his guidance, advices, supervision, and encouragement in completing this project. The valuable and useful ideas that he had shared with me are very much appreciated.

I wish to thank to all lecturer for his help, knowledge, suggestions, and support in solving the project's problems.

I would also like express my appreciation to my family, for give me a lot of support until I finish my study. May ALLAH SWT bless them all and thank you so much for their support.

Not forget a million of thanks to all my ***brotherhood*** members and friends for their supports and encouragement throughout completing my final year project. May Almighty Allah bless and reward them for their generosity.

ABSTRACT

This thesis describes about the development of single phase inverter for photovoltaic (PV) application circuit with Sinusoidal Pulse Width Modulation (SPWM) as switching technique. This project consists of two parts simulation model and experimental testing. Matlab simulink is used to simulate the circuit with SPWM signal output. The simulation results are presented and discussed. A prototype of single phase inverter is constructed using SPWM switching technique controlled by PIC16F877A. The controller which is the driver of the circuit concept also will be implemented in order to monitor and control the output voltage, so that the input and output voltage is always in synchronous and stable condition based on the duty cycle.

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CHAPTER 1

INTRODUCTION

1.1 Background Of Project

Inverter is commonly used to supply DC power fed from DC sources UPS (Uninterruptable Power Supply) or batteries. Recently the most technology that applies these electrical devices is solar energy system [1]. This system uses an inverter that converts direct current into alternating current. A DC-to-AC converter is known as inverter that is used to change a dc input voltage to a symmetric ac output voltage of desired magnitude and frequency [2] Solar energy have been said as the best source for generate electric. The application of solar energy can saves a conventional energy and reduces environmental pollution as known; this system involves a single grid-tie inverter connected to a series string of PV panels. The limitations have been found when used, the PV panels where the maximum power point tracking (MPPT) is performed for the entire series string of PV panels, which is not optimal given variations among panels and variations in illumination of each panel [3]. A permanent defect or even a temporary shade to a single panel in an array, which is controlled by a single inverter, limits the performance of the entire string [2].

Basically, the output of the inverter contains a high Total Harmonics Distortion (THD). Hence, the pulse width modulation (PWM) is a one method to reduce the harmonics because PWM inverters manage to eliminate harmonics in relatively easier way as compare to traditional square-wave inverters [8]. The PWM also can shift all the harmonics into a much higher frequency, causing the filter design become easier than the square-wave and quasi-square wave inverters. In order to successfully produce output with low total harmonics distortion, a unipolar switching scheme is employed in design