Single Phase Induction Motor
Solid State Drive using PWM Technique

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ACKNOWLEDGEMENT

"In the name of Allah, Most Gracious, Most Merciful"

The research presented in this dissertation could not have been conducted without the support, encouragement, and cooperation of many people. First of all, I would like to express my deepest gratitude to my supervisor, Dr. Azilah Saparon, who has always given valuable advice and encouragement throughout in working on this project successfully. I would like to thank her for giving the opportunity to learn and work under guidance, which has been the most memorable experience.

Special thanks to my entire family for their encouragement, knowledge and their constant prayer for me. Last but not least, I am thankful to my friends Mohd Azril bin Ab. Raop and Norazam bin Aziz for their encouragement, criticism and support for this project. Without their support, I would be struggling to finish this project.

Thanks also to whom which direct or indirectly involved in this projects.

ABSTRACT

This paper presents torque speed in single phase AC induction motor using PWM inverter. Nowadays AC induction motors are widely used in home appliances and other multipurpose instruments. An ATmega328 microcontroller (arduino uno) is used to generate the desire pulse width modulation (PWM) to optocouplers. Optocouplers function is like a driver to isolate the triggering pulse for buffering and sending to inverter where it will control the H-bridge inverter. Four IRF740 (power MOSFET) used to perform H-bridge inverter and 240 Volt DC voltage supply to this inverter then due this inverter circuit it converted to AC voltage to fed induction motor. The final output will be observed by measuring the rotor speed (rad/s) and the electromagnetic torque (Nm). The simulation is done using matlab/simulink and Psim.

Keyword: pulse width modulation, inverter and microcontroller.

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CHAPTER 1

INTRODUCTION

1.1 Background

The inverters are widely used in electrical applications; start with small switching power in computer to large electric utility such as solar, air conditioner and motor [1]. Inverter is the devices that converts direct current (DC) into alternating current which is (AC) opposite to the function of rectifier. The main problem in inverter is harmonic distortion due to several causes among them are the modulation algorithm, nonlinearities in the output filter, dead times, voltage drops across the switches and modulation of DC bus voltage [2]. The total harmonics distortion must be less than 5% according to IEEE 519 standard [3].

Due to this problem, by adjusting the switching frequency and passive filters, the lower order harmonics can be reduced [4]. The factor that contributes to the harmonics distortion and the way to reduce the distortion is studied and the most popular method controls the gate of the inverter in the circuit is using PWM control [4]. Thus, a good controller circuit such as Atmega328 microcontroller is used to generate the PWM.

As for the motor, there are probably more single phase AC motors induction motors are used today than other types because of less expensive and lowest maintenance [4]. The induction motor can run only at its rate speed when it is connected to the main supply but they are constant motor. The single phase type of motor used for this circuit is main and auxiliary winding for stating torque motor [5].