CONTROLLING 3-PHASE INDUCTION MOTOR USING SINUSOIDAL PULSE WIDTH MODULATION METHOD.

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ABSTRACT

This thesis presents a simple constant volt per hertz control, sinusoidal pulse width modulation output voltage for a three-phase induction motor drive. Essentially an open loop speed control scheme was adopted. The constant V/f speed control involves simultaneous adjustment of voltage and supply frequency in order to achieve variable speed with constant torque. The constant volt per hertz (V/f) method is an effective method for AC motor drive speed regulation. The PIC16F877A microcontroller from microchip was used to generate the SPWM signal to implement the control scheme. Also simple techniques for generating the modulation waves of SPWM methods are described.

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CHAPTER 1

INTRODUCTION

1.1 Overview

AC induction motors are the most common motors used in industrial motion control systems, as well as in main powered home appliances. Simple and rugged design, low-cost, low maintenance and direct connection to an AC power source are the main advantages of AC induction motors. Various types of AC induction motors are available in the market. Different motors are suitable for different applications. Although AC induction motors are easier to design than DC motors, the speed and the torque control in various types of AC induction motors require a greater understanding of the design and the characteristics of these motors. [1] Nowadays, industry places high demand on control accuracies, flexibility, ease of operation, and repeatability of parameters for many applications such as in induction motor drives are the main desirable features. To meet these requirements, use of microcontrollers has become imperative [3].The advantage of microcontroller-based control over the conventional discrete hardware-based control can be easily recognized for complex drives control system. The software control algorithm can be easily altered or improved without changing the hardware. Induction motors are the most widely used motors for appliances, industrial control, and automation; hence, they are often called the workhorse of the motion industry. They are robust, reliable, and durable. When power is supplied to an induction motor at the recommended specifications, it runs at its rated speed. However, many applications need variable speed operations. For example, a washing machine may use different speeds for each wash cycle. Historically, mechanical gear systems were used to obtain variable speed. Recently, electronic power and control systems have matured to allow these components to be used for motor control in place of mechanical gears. These electronics not only control the motor's speed, but can improve the motor's dynamic and steady state characteristics. In addition, electronics can reduce the system's average power consumption and noise generation of the motor. [5]