بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأفلام قد أعدت دون أية تغيرات

يجب أن

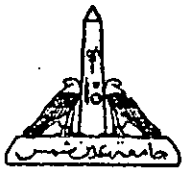
تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ منوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%

بعض الوثائـــــق الاصليـــة تالفـــة

بالرسالة صفحات لم ترد بالاصل



AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
ELECTRICAL POWER AND MACHINES DEPARTMENT

INTELLIGENT AC DRIVE

BY

MOSTAFA IBRAHIM MOHAMED MAREI
B.Sc., Ain Shams University 1997

A thesis submitted to Ain Shams University for the requirements of the degree of MASTER OF SCIENCE

IN

ELECTRICAL ENGINEERING (Power and Machines)

Under the Supervision of

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Dr. Hussein Mohamed Mashaly
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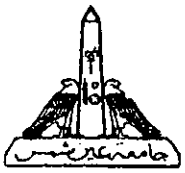

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Dissertation for: Master Degree in Electrical Power Engineering

Dissertation Title: Intelligent AC Drive

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STATEMENT

This thesis is submitted to Ain Shams University in partial fulfillment of requirements for the degree of Master of Science in Electrical Engineering.

The research included in this thesis was carried out by the author in the Department of Electrical Power and Machines, Faculty of engineering, Ain shams University, Egypt.

No part of this thesis has been submitted for a degree or a qualification at any other university or institution.

Name : **Mostafa Ibrahim Mohamed Marei**
Signature :
Date :

The thesis is dedicated to my Parents and my Grandam

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ABSTRACT

Vector control of industrial induction motor drives have gained the widest acceptance in high performance applications. Through this control method the highly coupled, nonlinear, multivariable induction motor is reduced to linear independent flux and torque control similar to that of a separately excited DC motor control. Field oriented control (FOC) means, in general, decoupled flux linkage and torque yielding fast torque response of AC motor to emulate DC machine behavior. This thesis treats the indirect field oriented control (IFOC) for the rotor flux because it provides pure decoupling between flux and torque.

The current controller plays very important role in current regulated pulse width modulation (CRPWM) inverter. The controller should be able to force the drive current to follow the reference current, generated from the IFOC algorithm, as quickly as possible and guarantee the decoupling control. A novel space vector modulation (SVM) based hysteresis current controller (HCC) is utilized. This technique utilizes all the advantages of the HCC and SVM techniques. The proposed configuration reduces significantly the number of switchings of the solid state switches and at the same time gives the same space vector as those obtained from the SVM technique. The current controller confines space vectors from a region detector and applies a proper space vector selected according to inner HCC for better current wave form.

Fuzzy logic control (FLC) provides a means for synthesizing the controller from engineering experiences to give robust performance. This thesis presents an integration of FLC with the IFOC combined with SVM based HCC PWM inverter. The FLC is employed to regulate the drive speed by generating a torque reference to the IFOC algorithm.

An extensive digital simulation of the described intelligent induction motor drive is presented. Also, a complete dynamic investigation of the

drive under different operating conditions is presented to prove the effectiveness of the proposed system.

The simulation results of the proposed technique validates all the advantages of SVM based HCC to reduce significantly the switching frequency. A negligible response time of current error is observed. Also it is insensitive to line voltage and load parameter variations. The integrated system reflects a promising dynamic behavior of the drive. The simulation under different dynamic conditions proved the robustness of the drive control system.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND SYMBOLS
LIST OF TABLES
LIST OF FIGURES
CHAPTER 1
INTRODUCTION

1.1 Basic Electric Drive Requirements 1
1.2 Induction Motor Drive Control Methods 2
1.2.1 Volt/Hertz Control 5
1.2.2 Torque and Flux Control 5
1.2.3 Stator Current with Open Loop Flux Control ...6
1.3 Field Orientation Control 8
1.3.1 Principle of Field Orientation 10
1.3.2 Techniques of Field Orientation 14
1.3.2.1 Direct Field Oriented Control (DFOC) ..14
1.3.2.2 Indirect Field Oriented Control (IFOC) ..15
1.4 Current Controllers 18
1.4.1 Current Control Techniques 19
1.4.1.1 Ramp Comparison Current Controller ...19
1.4.1.2 Predictive Current Controller 21
1.4.1.3 Hysteresis Current Controller 21
1.5 Thesis Outline 23

CHAPTER 2
SPACE-PHASOR MODEL OF 3-PHASE INDUCTION MACHINE

2.1 Introduction 25
2.2 The Space Phasor of Different Quantities 25
2.3 Vectorial Model of Induction Machine 27
2.4 Commonly Used Reference Frames 29
2.5 Frames Transformation 30