ANALYSIS OF TRANSIENT RESPONSE IN INDUCTION MOTOR

Thesis presented in partial fulfillment for the award of the Bachelor of Engineering (Hons) Electrical Of UNIVERSITI TEKNOLOGI MARA



MUHAMMAD FIKRY B ABDULLAH FACULTY OF ELECTRICAL ENGINEERING 40450 SHAH ALAM, SELANGOR DARUL EHSAN MALAYSIA MAY 2009

ACKNOWLEDGMENT

First and foremost, 'Syukur Alhamdulillah" to Allah, the Most Gracious And most Merciful for ensuring myself to be healthy to carry out my study and to complete this thesis with success. Secondly, I wish to convey my deepest gratitude and appreciation to Associate Professor Bibi Norasiqin binti SH Rahimullah for her moral support, guidance, encouragement, and patience all the way from the beginning till the end of this project, without her cooperation and substantiation for this thesis, it would have been impossible.

And last but not least, I wish to take this chance to give my highest appreciation, gratitude and love to my parent: Abdullah Ab Rahman and Azizah Jaafar, my brothers and sisters for the financial support, motivation and for the encouragement, patience and prayers which enable the project to be complete as required. Also not forget, to all my friends and lecturers, who have give me knowledge and moral support throughout this project.

May God bless them all.

Wassalam.

MUHAMMAD FIKRY ABDULLAH

Faculty Of Electrical Engineering University Teknology Mara (Uitm) Shah Alam, Selangor Darul Ehsan

ABSTRACT

This study investigates the nature of transient phenomena found in an induction motor using Matlab Simulink. An induction motor has a very high initial starting current in which could be three to eight times the rated value. Such transient phenomenon is not acceptable. It comprises of background review of induction motors and the type of induction motor modeled. Parameters are extracted from the selected induction motor by the means of experimental results while some are synthetic parameter values. By using MATLAB Simulink , the transient response in a controlled environment can be observed. In the process of the simulation, the control settings can be changed and the transient response is displayed in the graphical format with variable loading to ensure better understanding of the outcome. Results obtained from Simulink model show that the transient phenomena of an induction motor can be investigated.

TABLE OF CONTENTS

CONTENTS

Declaration	í
Acknowledgements	ii
Abstract	ili
Table of Contents	iv
List of Figures	vii
List of Tables	ix
Abbreviations	X

CHAPTER

PAGE

1	INTRODUCTION	
	1.1 Background	1
	1.2 Objectives	3
	1.3 Scope of work	3
	1.4 Thesis overview	4
2	LITERATURE REVIEW	
	2.1 Literature Review	5
	2.2 Introduction of Transient Response In Induction Motor	5
	2.3 Theoretical Background	5
	2.4 Equivalent Circuit of Induction Motor	6
	2.5 Analysis and Performance	7
	2.6 Dynamic Performance of Induction Motor	9
	2.7 Control Principle of the Induction Motor	12
	2.8 Test To Determine Equivalent Circuit	14
	2.8.1 No-Load Test	14

2.8.2 Blocked Rotor Test	16
2.8.3 DC Resistance Test	16

3 METHODOLOGY

3.1 Understanding The Transient Response In Induction	18
Motor	
3.2 Experimental	18
3.3 MATLAB Simulink Software	19
3.4 Simulation Process	19
3.4 Flow Chart	20

4 MODELING AND SIMULATION

4.1 Introduction	21
4.2 Induction Motor Model	30
4.3 Simulink Implementation	25
4.3.1 Field-Oriented Control Block (FOC)	26
4.3.2 abc-syn Conversion Block(abc2qds block)	28
4.3.3 syn-abc Conversion block (qde2abc Block)	29
4.3.4 Induction Machine in Stationery Block	29
4.4 Mathematical Simulation	31

5 RESULTS AND DISCUSSION

5.1 Experimental Result	35
5.1.1 No-Load Test Result	35
5.1.2 Blocked Rotor Test	36
5.1.3DC Resistance Test	37
5.1.4 Result of Parameter	37
5.2 Simulation Result	38
5.2.1 Steady-State Characteristic Result	39
5.2.2 Simulated Result of First Simulation	40