

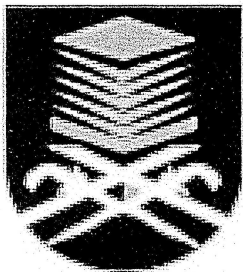
Dynamic Modeling of Induction Motor

Based On Stator Reference Frame

Thesis is presented in partial fulfillment for the award of the

Bachelor of Electrical Engineering (Hons)

UNIVERSITI TEKNOLOGI MARA



HAZWANI BINTI HAIRUDDIN

2007283858

FACULTY OF ELECTRICAL ENGINEERING

UNIVERSITY TEKNOLOGI MARA (UiTM)

SHAH ALAM

MAY 2011

ACKNOWLEDGEMENTS

First of all, I really would like to thank to Allah s.w.t for His approval and blessing that made all this happened and came true. Nothing can be done without His permission. Alhamdulillah.

A special and most honored gratitude to my Ir. Mohamad Aris Bin Ramlan for his guidance, teachings and support throughout this project. I am truly honored and humble to have him as my supervisor because his knowledge and expertise is very vast and wide. I am beyond doubt enjoyed the challenge of discussing and debating various aspects and topics regarding my project with him which later helped me improve my final project and knowledge about it.

Special thanks to my acquaintances for helping me with their precious suggestions and supports throughout the completion of this project. Your kindness will be embedded in my heart forever.

ABSTRACT

Understanding of dynamic characteristics of the three-phase induction motor is essential for its high performance applications such as in production automation. The development of dynamic model of induction motor based on stator reference frame is discussed in this paper. D-q axis based modeling using stator reference frame is proposed to analyze the transient performance. The algorithm of the model is incorporated in MATLAB tools for the proposed project. Results obtained from the simulation include air gap torque, speed, actual stator and rotor current and magnitude of stator flux linkages. The reliability of the developed model is determined by comparisons. The results of analysis performed revealed that the obtained simulated results are comparable with that of the other known reliable results. Thus, this provides an indication that the developed model is useful for use in performing simulation and computation of performance characteristics of three-phase induction motor.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	iii
ABSTRACT.....	iv
TABLE OF CONTENTS.....	v
LIST OF FIGURES.....	vii
LIST OF SYMBOL AND ABBREVIATIONS.....	ix
CHAPTER 1: INTRODUCTION	
1.1 OVERVIEW.....	1
1.2 OBJECTIVE.....	2
1.3 SCOPE OF WORK.....	2
CHAPTER 2: LITERATURE REVIEW	
2.1 INDUCTION MOTOR.....	3
2.1.1 Basic Operation Of The Induction Motor.....	3
2.1.2 Equivalent Circuit Model.....	4
2.1.3 Principle Of Electric Machine And Power Electronics.....	5
2.2 ORDINARY DIFFERENTIAL EQUATION.....	7
2.2.1 Numerical Analysis.....	8
2.2.2 Numerical Ordinary Differential Equations: Runge Kutta Method.....	9
2.3 MATLAB /SIMULINK.....	10

2.4 DYNAMIC MODEL.....	11
2.4.1 The Initialization Of Dynamic Induction Motor Model.....	12
2.4.2 Induction Motor Considering Iron Loss.....	13
2.4.3 Dynamic Model Of Induction Motor For Vector Control.....	13
 CHAPTER 3: METHADODOLOGY	
3.1 MATHEMATICAL MODELING.....	15
3.1.1 Two Phase Induction Motor.....	15
3.1.2 Three Phase To Two Phase Transformation.....	16
3.2 PROGRAM.....	23
3.3 SIMULATION.....	24
3.4 DATA RESULT.....	24
3.5 ANALYSIS.....	24
 CHAPTER 4: RESULTS AND DISCUSSIONS	
4.1 OVERVIEW.....	25
4.2 SIMULATED RESULT.....	26
4.2.1 Result Simulation.....	26
4.2.2 Discussion.....	28
CHAPTER 5: CONCLUSIONS.....	33
RECOMMENDATIONS FOR FUTURE WORK.....	34
REFERENCES.....	35
 APPENDICES	
Appendix A.....	36
Appendix B.....	46