MATHEMATICAL MODELING AND SPEED CONTROL OF PERMANENT MAGNET SYNCHRONOUS MOTOR

A PROJECT REPORT

Submitted in partial fulfillment of the requirements

For the award of the degree of

BACHELOR OF TECHNOLOGY

In

ELECTRICAL AND ELECTRONICS ENGINEERING

SUBMITTED

by

V.N,VYAMUNA(10F01A02B3 ) G.SRIKANTH(11F05A0209)

N.LALITHAKUMARI(11JD5A0204) M.HARSHA VARDHAN(08F01A0240)

under the esteemed guidance of

Mr.A.PAVAN KUMAR M.Tech

Assistant professor



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ST.ANN’S COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by A.I.C.T.E New Delhi, Affiliated to JNTU Kakinada & NAAC with ‘A’ grade Accredited by NBA New Delhi, IE (I) Kolkata) chirala-523187

2010-2014

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ST.ANN’S COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by A.I.C.T.E New Delhi, Affiliated to JNTU Kakinada & NAAC with ‘A’ grade Accredited by NBA New Delhi, IE (I) Kolkata)

2010-2014



CERTIFICATE

This is to certify that the project work entitled “MATHEMATICAL MODELING AND SPEED CONTROL OF PERMANENT MAGNET SYNCHRONOUS MOTOR” is a bonafide record of Mr./ MS ------------------,Regd No ------------------, who carried out under my guidance and supervision, as a partial fulfillment for the award of degree of Bachelor of technology in Electrical and Electronics Engineering from J.N.T.University,Kakinada,during the academic year 2010-2014

A.PAVAN KUMAR M.Tech S.V.D.ANIL KUMAR M.Tech (Ph.D)

PROJECT GUIDE HEAD OF DEPARTMENT

Viva voice date:

EXTERNAL EXAMINER

**ACKNOWLEDGEMENT**

The successful completion of any task is not possible with out proper suggestion, guidance and environment. The combination of these three factors act like back bone to our “**MATHEMATICAL MODELING AND SPEED CONTROL OF PERMANENT MAGNET SYNCHRONOUS MOTOR” project**.

We express our sincere thanks to our guide Assistant professor **Mr.A.PAVAN KUMAR., M.Tech.** for timely help, guidance and providing us with the most essential materials required

For the completion of this work

We are greatly indebted to our Head, Department of Electrical& Electronics Engineering Associate professor, **MR.S.V.D.ANIL KUMAR., M.Tech., Ph.D.** for his valuable suggestions course period.

We would like to thank our principal, **Dr.C.Subba Rao., M.Tech.,Ph.d(I.I.T.,Kh),F.I.E.** for providing support and stimulating environment we would like to express our gratitude to the management of **ST.ANNS COLLEGE OF ENGINEERING AND TECHNOLOGY, CHIRALA** for providing us with a pleasant environment excellent laboratory facilities.

We would be thankful to all the teaching &non –teaching staff of the Department of Electrical and Electronics Engineering for the co-operation given for the successful completion of the project.

Project Associates

V.N.V.YAMUNA (10F01A02B3)

G.SRIKANTH (11F05A0209)

N.LALITHA KUMARI (11JD5A0204)

M.HARSHA VARDHAN (08F01A0240)

**ABSTRACT**

This project deals with detailed mathematical modeling and speed control of permanent magnet synchronous motor drive system using mat lab/simulink. in pmsm the conventional electro magnetic field poles are replaced by permanent magnets in rotor.pulse width modulation control scheme associated with pi controller has been used to reduce steady state error.pmsm have high efficiency.pmsm has many applications like automative and industrial automation including traction and robotics.

**INDEX**

**CONTENTS Page No**

**List of Figures i**

**Abstract ii**

**CHAPTER 1: INTRODUCTION 1-2**

1.1Motivation 1

**CHAPTER 2: DESCRIPTION OF THE DRIVE SYSTEM 3-15**

2.1 permanent magnet synchronous 3

Motor drive system

2.2 Permanent magnet synchronous Motor 3

2.3 position sensor 7

2.4 Current control inverter 10

**CHAPTER 3: MODELLING OF PM DRIVE 16-28**

3.1Detailed modeling of PMSM 16

3.2PM motor control 19

3.3Speed control of PM motors 24

**CHAPTER 4: DRIVE SYSTEM SIMULATIONS IN SIMULINK 29-36**

4.1Simulation tools 29

4.2Simulink simulation of PMSM drives 30

**CHAPTER 5: SIMULATION RESULTS 37-42**

**CHAPTER 6: CONCLUSION 4**

**REFERENCES 44**