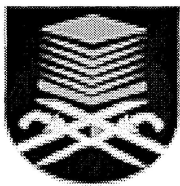


**MODELLING OF SINGLE PHASE INDUSTRIAL
NETWORK FOR BASIC POWER QUALITY STUDIES
USING MATLAB/SIMULINK**

This report is presented in partial fulfillment for the award of the
Bachelor of Electrical Engineering (Hons)
UNIVERSITI TEKNOLOGI MARA



NIK AZHA BIN NIK JAAFAR
Faculty of Electrical Engineering
UNIVERSITI TEKNOLOGI MARA
40450 Shah Alam
Selangor Darul Ehsan

ACKNOWLEDGEMENT

In the name of ALLAH, the Beneficent and Merciful who has given me the strength and ability to complete this final project as well. First and foremost, I would like to take this opportunity to express my sincere gratitude and appreciation to my kindly project adviser, En. Mohd Zaki bin Abdullah and En. Mustafar Kamal bin Hamzah whose patience, inspiration, ideas, suggestions, constant guidance and on their dedication have helped me to successfully complete this final year project.

Recognition is given to various members of the academic and technical staff of UiTM. Particular appreciation is given to Encik Aris Ramlan for his assistance. And also thanks due to present members of Power Electronic Research group for their help and support.

Finally I would like to extend my sincere thanks to all lectures, staff and friends for the continuous assistance in every aspect either directly or indirectly throughout to complete this project.

MAY ALLAH BLESS ALL OF US

Thank You.

Nik Azha Bin Nik Jaafar

Universiti Teknologi MARA,

Shah Alam, Selangor.

ABSTRACT

This report is concerned on works related to computer modelling of a simple industrial power system for purposes of studying the various power quality problems existing within a supply network due to the use of various non-linear loads. Modelling is based on power system blockset (PSB) tool within the MATLAB/Simulink software, which is powerful software tool for various powers engineering simulation. Various individual non-linear loads are modeled and simulated. Results from the basic models implemented using Pspice developed by others and obtained from reference to ascertain its accuracy. Subsequently this basic model is being used in a simple single-phase system to study the effects of various loads on the operation of the supply network.

TABLE OF CONTENTS

CHAPTER	DESCRIPTION	PAGE
1	INTRODUCTION	
	1.1 Introduction	1
	1.2 Power electronic simulation concept	2
	1.3 Blockset modelling of the component	3
	1.4 Basic supply system network	4
2	LITERATURE RIVIEW	
	2.1 Type of load	6
	2.1.1 Linear load	6
	2.1.2 Nonlinear load	6
	2.2 Description of harmonics	7
	2.2.1 Fundamental frequency and harmonics	10
	2.3 Harmonics distortion	11
	2.3.1 Definitions	11
	2.3.2 Alternative definitions	12
	2.4 Source harmonics	14
	2.5 Effect of harmonics	14
	2.6 Electronic switching power converters	15
	2.6.1 Half wave rectifier with RL load	16
	2.6.2 Half wave rectifier with RC load	18
	2.6.3 Full wave rectifier with RL load	20
	2.6.4 Full wave rectifier with RC load	21
	2.7 Controlled bridge rectifier with DC motor load	23
	2.7.1 Thyristor controlled DC motor	24

CHAPTER	DESCRIPTION	PAGE
	2.8 Induction motor	29
	2.8.1 Single-phase induction motor	30
	2.8.1.1 Steady state analysis	32
	2.8.1.2 Average torque in Steady state	33
3	COMPUTER MODELLING	
	3.1 Introduction	34
	3.1.1 Circuit model in Pspice simulation	35
	3.1.2 Circuit model in MATLAB/Simulink	40
4	RESULT AND DISCUSSION	
	4.1 Introduction	50
	4.1.1 Half wave rectifier with RL load	51
	4.1.2 Half wave rectifier with RC load	52
	4.1.3 Full wave rectifier with RL load	53
	4.1.4 Full wave rectifier with RC load	54
	4.1.5 Single-phase thyristor rectifier with DC motor load	54
	4.1.6 Single phase network feeding Different load	55
	4.1.7 Single-phase line system with Resistive load	57