

DEVELOPMENT OF SPACE TIME BLOCK CODE USING QPSK AND GMSK MODULATION TECHNIQUE

Thesis is presented in partial fulfilment for the award of the

Bachelor of Electrical Engineering'(Hons)

UNIVERSITI TEKNOLOGI MARA

AMER MASRIBM ROSLAH
Faculty of Electrical Engineering
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM
SELANGOR, MALAYSIA

NOV 2006

ACKNOWLEDGEMENT

In the name of ALLAH the Most Gracious and the Most Merciful, it is with the deepest gratitude that ALLAH gives me strength and ability to complete this project.

First and foremost, I would like to express my gratitude to my advisor, Pn. Azlina Idris for his constant encouragement, guidance and research support throughout my degree's studies. His technical advice and suggestions, made this work wonderful learning experience.

Finally, I want to thank my beloved parents, who have always stood behind me regardless of my decisions. They have encouraged me to get my degree and succeed in life more than anyone. I hope the effort that I put to complete this degree will be a new starting point for my professional career that will open many doors to future success.

ABSTRACT

This thesis will deal with two transmit antenna (also known diversity technique) and one receive antenna. And appropriate to space-time block code (STBC) technique against the Rayleigh fading channel by using QPSK and GMSK modulation techniques. As will be shown, the performance of diversity system depends on the combining scheme in order to choose the higher SNR and lower noise. The design of STBC is to achieve full spatial diversity against fading channel. At the transmitter, information signal are divide into two signals, after that these signals are encode by cyclic code, then modulated into the analogue carrier frequency using GMSK or QPSK. At the receiver, the signals are selected by using selective method by looking which signal has a higher SNR, lower noise then demodulated and decode back to produce the message. Finally, comparison will be made, which modulation techniques will give greatest result in diversity scheme and to prove that diversity better than no diversity base on bit error rate (BER). This project use MATLAB version 7.1 to simulate the performance of STBC.

TABLE OF CONTENTS

CHAPTER		PAGE
	DECLARATION	iii
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	TABLE OF CONTENTS	vi
	LIST OF FIGURES	viii
	LIST OF TABLES	ix
	LIST OF ABBREVIATIONS	x
1	INTRODUCTION	
	1.1 Background	1
	1.2 Objective	3
	1.3 Scope of Project	3
	1.4 Thesis Organization	3
2	LITERATURE REVIEW	
	2.1 Modulation technique	4
	2.1.2 Quadrature Phase Shift Keying	4
	2.1.3 QPSK in time domain	9
	2.1.4 Applications of QPSK	10
	2.1.5 Gaussian Minimum Shift Keying	10
	2.2 Coding	12
	2.3 Linear Block Code	13
	2.3.1 Cyclic code	15
	2.4 Rayleigh Fading	17
	2.5 Multipath Interference Effect	20
	2.6 Diversity	21
	2.6.1 Factors Affect Diversity Performance	23

2.6.2	Diversity Combining Technique	26
2.6.3	Selection Method	27
2.7	Multiple Input Single Output	29
2.8	Transmit Diversity Model	30

METHODOLOGY

3.1	System Model of Space Time Block Code	31
3.2	Simulation Methodology	33
3.3	Software Design	34

RESULTS AND DISCUSSIONS

4.1	Result	
4.1.1	QPSK	36
4.1.2	GMSK	42
4.2	Discussion	48

CONCLUSION

5.1	Conclusion	49
5.2	Future Development	50

REFERENCES	51
-------------------	----

APPENDIX

QPSK Programme	52
GMSK Programme	57