CROWN SQUARE MICROSTRIP FRACTAL ANTENNA FOR WIRELESS APPLICATION

Thesis presented in partial fulfillment for the award of the

Bachelor of Electrical Engineering (Hons)

UNIVERSITY TEKNOLOGI MARA MALAYSIA

AMIRA PUTRI BINTI MOHAMMAD

FACULTY OF ELECTRICAL ENGINEERING

UNIVERSITI TEKNOLOGI MARA MALAYSIA

40450 SHAH ALAM

SELANGOR, MALAYSIA

ACKNOWLEDGEMENT

First of all, I would like to thanks Allah for giving me the strength and guidance to successfully complete this project.

Secondly, I would like to convey my grateful thanks to Puan Kamariah Binti Ismail as my project supervisor for her advice, insightful comments and systematic guidance throughout the period of completing this project.

Thirdly, not forgetting also my sincere appreciation to my beloved parents, brother and sisters for their concern and support all these times. Having such a wonderful family is the most precious gift and blessings from Allah.

I would like to forward my special thanks to all staff Microwave Technology Centre that involves with my project and helps me a lot by giving me an idea and cooperation.

Lastly, I would like also to thanks to all my friends at Faculty of Electrical Engineering, UiTM Shah Alam for their encouragement, support and help during the developing of this project. Very grateful and thank you very much.

ABSTRACT

This paper presents the design of a crown square fractal antenna (CSFA) for wireless applications. This CSFA was fabricated on FR4 substrate with dielectric constant of $\epsilon r = 4.7$ and thickness, h = 1.6 mm. All the design and simulation was carried out by using a commercial electromagnetic simulator, CST Microwave Studio. Measurements of the parameter of this antenna was carried out by using Vector Network Analyzer (VNA).

This work consists of two measurement result that is without and with stub matching. The result for return loss of CSFA without using stub matching for simulation and measurement result are -11.174 dB and -6.091 dB respectively at resonance frequency 5.8 GHz . The simulated and measured results for VSWR are 1.396 dB and 2.968 respectively. All the measurement result without stub matching indicates poor performance and did not meet the specification of the CSFA.

The simulation and measurement result by using stub matching, give a better performance and meet all the specification of CSFA. The value of return loss for simulated result at frequency 5.8 GHz is -15.64 dB while for the measured return loss is -11.174 dB. The value of the return loss met the specification of CSFA because both values are lower than -10 dB and indicate good matching.

At the centre of frequenc , the value of VSWR for the simulated is 1.396 while measured VSWR is 1.763. Both values were less than 2 which means the design was approximately ideal. It was observed that, both the measured and simulated values of all parameters by using stub matching were close with each other and compact size antenna was realized. The performance of CSFA has been improved.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Antenna is a reciprocal device which is capable of radiating and receiving electromagnetic waves. It is used to interface a transmitter to free space or free space to a receiver. There are many type of antenna being used today such as dipoles, horns, and reflectors antenna. The choice of antenna used depends on the operating frequency.

Microstrip or patch antenna is widely used at microwave frequencies which consist of a patch of metallization on a grounded substrate, that is very thin with thickness, t where t $\ll \lambda_o$ and λ_o is the free-space wavelength. The height, h of the patch is a small fraction of a wavelength where $h \ll \lambda_o$, and usually $0.003\lambda_o \leq h \leq 0.05\lambda_o$) above a ground plane [1].

The microstrip antennas are usually used in the latest technology because of the antenna was compact, lightweight, and thin profile, which can be made conformal configuration [2]. Lightweight antenna provide low power handling capability and it can be used in low power transmitting and receiving applications. The feed line and matching networks can also be fabricated on the same substrate [2].

However, there are some limitations of microstrip antennas such as narrow bandwidth and complex feed structure. The bandwidth of the antenna depends on the dielectric constant, the thickness of the substrate and the resonant frequency [2]