

MINIATURIZATION OF FRACTAL KOCH DIPOLE ANTENNA FOR VHF BAND

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ABSTRACT

This thesis presents the design of dipole antenna applying the method of reducing size through fractal Koch curve technique. The antenna is designed to operate at Very High Frequency (VHF) band and resonates at frequency 268 MHz. The Koch curve technique is applied based on the number of iteration and degree of flare angle. Three types of antenna; conventional antenna, iteration 1 and iteration 2 of fractal Koch antennas were designed and simulated using Computer Simulation Technology Microwave Studio (CST-MWS). These antennas were fabricated using copper wire with 50 Ω SMA connector. A Vector Network Analyzer (VNA) was used to measure the return loss, S11. The performances of these antennas in term of return loss, directivity, gain and radiation pattern were observed and analyzed. The size of fractal antenna for iteration 1 and iteration 2 have been successfully reduced by 22.1 % and 34.6 % as compared to the conventional dipole antenna at the same frequency.

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CHAPTER 1

INTRODUCTION

This chapter is a brief introduction about the background study including problem statement, objectives, scope of work and outline of the thesis.

1.1 Background study

In radio and telecommunications, a dipole antenna is one of the most widely used class of antenna. It is incorporated in many RF antenna designs where it forms the radiating element [1]. Dipole antenna consists of an electrically conducting wire with a centre-fed driven element. It is made up of two conductors of rod or wire, split at the centre and each end of the centre is connected to the feed line. One of the most commonly used antenna is the half-wavelength dipole where the length of the antenna is half the wavelength of the signal [2]. The dipole antenna is widely used for wireless mobile communication system [3].

Antenna that operates at lower band has a limitation of longer dimension. The challenge in designing dipole antenna at VHF band is the length of the antenna become very long since it is operate at low frequency. It is difficult to construct a good antenna especially at low frequency band since the wavelength is much longer than the device [4]. Therefore, antenna with smaller dimension is more preferred for communication system. Many techniques have been proposed for size reduction of the antenna. A lot of researches have tried for more advance design in order to achieve the requirement and one of the method is by fractal antenna [5] [6].