SEIRPINSKI GASKET FRACTAL ANTENNA WITH RING-SHAPED DEFECTED GROUND STRUCTURE.

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ABSTRACT

This work presents the design and fabrication of a Sierpinski gasket fractal antenna with ring-shape defected ground structure (DGS) with the center frequency of 5.8 GHz. The antenna was designed and simulated by using Computer Simulation Technology (CST) and fabricated on RO5880 substrate with dielectric constant, ε_r of 2.2 with thickness of 0.381 mm. Vector Network Analyzer (VNA) was used to measure all the parameters of the antenna such as return loss, VSWR and input impedance. The inclusion of the ring-shape defected ground structure was to improve the overall performance of the antenna. Performance of the proposed antenna is discussed in terms of return loss, gain, input impedance, VSWR, bandwidth and radiation pattern.

There were two measurements made which are without stub and with stub matching. For without stub matching, the measurement result was shifted to 5.865 GHz from the center frequency with the return loss is -17.762 dB. After stub-matching applied to the Sierpinski antenna, the simulated and measured results were close to each other and achieved the specification for this work at 5.80 GHz the return loss is -25.307 dB and unidirectional radiation pattern was realized. The proposed antenna was very compact in size and the measured and simulated values of the parameters of the antenna concur well.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND STUDY

An antenna was defined by the IEEE as a means for radiating or receiving radio waves while Webster's defination as usually metallic device such as rod or wire for radiating or receiving elements [1]. In the other words, an antenna is a device for converting electromagnetic radiation in space into electrical currents in conductors or vice-versa, depending on whether it is being used for receiving or for transmitting respectively.

The evolution of modern wireless communications has been increasing dramatically and hence the demand for antennas. These devices become smaller and lightweight. Microstrip antenna can meet these requirements due to their characteristics such as lightweight, easy to fabricate and have low profile. Moreover, they are low cost and can easily integrated into arrays or into microwave printed circuit [2].

Due to effects of the evolution in modern wireless communication systems and increasing of other wireless applications that need wider bandwidth, multiband operation and low profile has initiated antenna research in various directions and one of them is by using fractal antenna geometry. The term fractal describes a family of complex shapes that possess an inherent self-similarity in their geometrical structure. Fractal antenna gained their importance because of having interesting features like miniaturization, wideband, multiple resonance and reliability [3].