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Design of A Novel Patch Antenna With L Slot

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ABSTRACT

Conventional Patch antennas when etched with regular geometry resonates at a lower frequency. Initially patch was found to resonate at 2.4 GHz. In this paper, by creating a simple L shaped structure on the patch the antenna is found to resonate at 1.92 i.e. in PCS spectra. The simulated model and its analysis are presented.

Keywords: Microstrip patch antenna, Fractal linear polarization, wireless applications, swastik, spiral slot, radar, SATCOM applications

I. INTRODUCTION

Microstrip antenna finds application in vital wireless communications prevailing in the world like satellites, mobiles, cellular, Radar, Pcs etc. Because of its repeatability and portable nature and ease of connection; their use in any above of the application has become a must.The basic design of such antennas are available in many text books and internet. The effect of creating slots and the review of such antennas could be seen in [1-8]. This paper presents the design of a patch and a simple slot on a patch creating good amount of miniaturization.

DESIGN OF A PATCH WITH A L SHAPED SLOT

A coaxial fed conventional patch using NELTEC NY 9220 substrate with relative permittivity of 2.2 with a thickness of 62 mils is designed then its etched out with metals to get a L shaped slot on its patch [1,2]. The size of the Patch is 4.94 X 4.14 cm. The top view as well as its 3 D view, Return loss are seen in Figures 1 and 2-3.

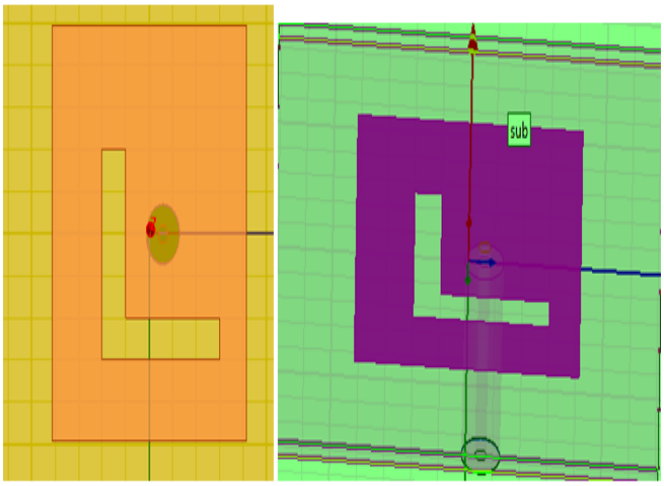

Figure 1. Proposed Antenna

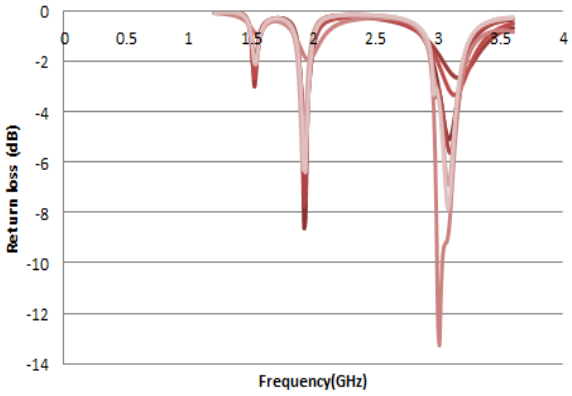

Figure 2. Parametric analysis of varying Coaxial feed positions-Reflection Coefficient of the Proposed Antenna.

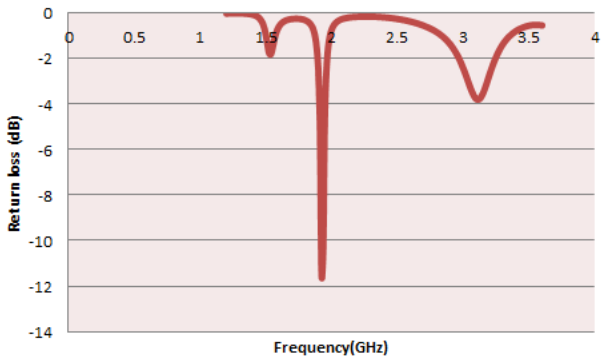

Figure 3. Reflection Coefficient of the Proposed Antenna.

ANALYSIS OF THE PROPOSED ANTENNA

The Coaxial fed antenna is optimized to resonate at 1.9236 GHz and its return loss characteristics are shown in Figures 2-3. Various position of feed is simulated to find the optimal position for feed. Finally The value of S_{11} is -11.54 dB at 1.9236 GHz is optimized which indicates good match. The Polar Plot of gain and gain plot at the discrete resonant frequencies are shown in Figs.4-5. The simulated antenna parameters are seen in Table 1.

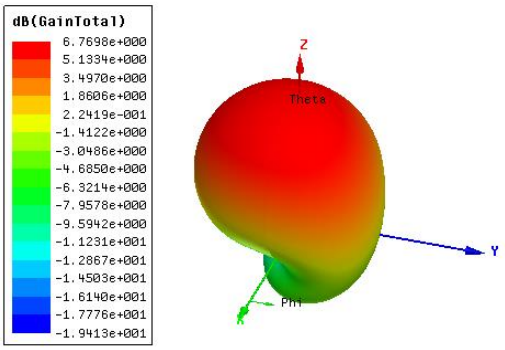

Figure 4. Gain total of the Proposed Antenna

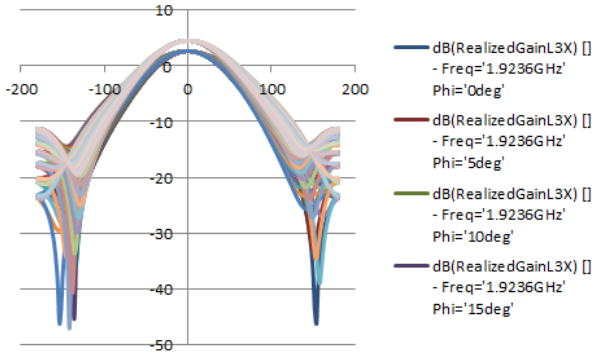

Figure 5. Gain of the Proposed Antenna

Table 1: Parameters of the Proposed Antenna

Antenna Parameters:

Quantity	Value	Units
Max U	0.0037036	W/sr
Peak Directivity	5.3267	
Peak Gain	5.035	
Peak Realized Gain	4.6979	
Radiated Power	0.0087374	W
Accepted Power	0.0092436	W
Incident Power	0.0099069	W
Radiation Efficiency	0.94523	
Front to Back Ratio	59.051	
Decay Factor	0	

II. CONCLUSIONS

The antenna has nearly 33% size reduction when compared with conventional patch. The antenna parameters like gain, directivity are found to be adequate. The radiation effieciency is 94%. The co and cross pol levels are also more than -12 dB difference and the antenna exihibits linear polarization. It can be realised using photolithographic techniques hence very cheap.

III. ACKNOWLEDGEMENTS

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