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Rectangular Slot for Band Enhancement Technique Coaxial Feed Patch Antenna

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Abstract -- In this paper describes the design and simulation of Rectangular slot patch antenna using Hfss11.1 electromagnetic simulation software using coaxial feeding technique. The Rectangular slot patch antenna is being deliberate for amateur radio. Rectangular slot microstrip antenna gives better performance in return loss; effectiveness. This paper proposes the design and simulation of different stages of antenna with DGS and the performance characteristics of this antenna reported in this paper. Ground slot cutting and slot cutting technique being used in this paper to enhance band width.

Indexed Terms: Slot, microstrip, Simulation, Return loss. Ground slot cutting

I. INTRODUCTION

An Antenna is a transducer which changes over the electrical power into the electromagnetic waves and the other way around. The idea of Microstrip reception apparatus was first proposed by Georges Deschamps in 1953 in USA. In 1955, Gutton and Baissinot licensed a level aeronautical that can be utilized in the UHF locale in France. The quick improvement of microstrip radio wire innovation started in the late 1970s. By the mid-1980s essential microstrip radio wire was entrenched as far as demonstrating plan and the specialists were include in turning their considerations for improving receiving wire execution highlights, (for example, data transfer capacity), and to upgrade applications in different fields by cutting one or various spaces.

The microstrip Antenna has attributes, for example, low profile, low weight and low assembling expense. Thus, the microstrip fix receiving wire can be utilized in Radars, rockets, shuttles, robots and mobiles, where size, weight and cost are limitations. DGS worked so as to upgrade Data transfer capacity. Customary microstrip fix radio wires have a leading patch imprinted on a substrate. The state of fix of the reception apparatus might be square, rectangular, roundabout, triangular, curved or of other explicit designs.

II. ANTENNA DESIGN

In this model, a coaxial fed Rectangular slot microstrip patch antenna is presented. The FR4 epoxy dielectric material of relative permittivity 4.4 and loss tangent of 0.019. With the thickness of 1.6mm is used as a substrate of the antenna. The proposed antenna is excited by coaxial probe feeding technique and probe is located at (-2.9 mm, 0 mm,-3 mm). Dimension of patch of length 6.4 mm and width 9 mm as shown in figure 1.

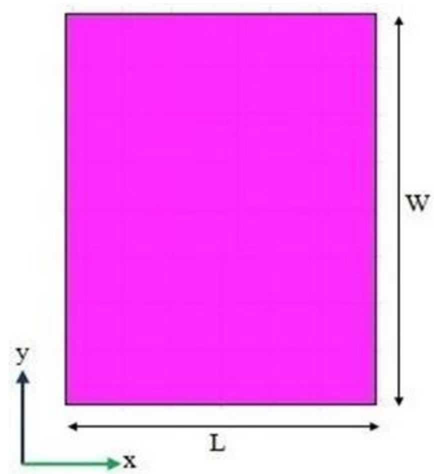

Fig.1 Simple rectangular patch

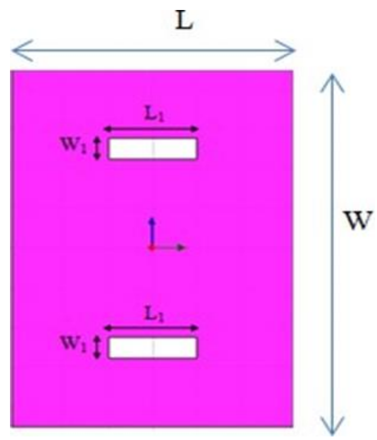

Fig.2 Rectangular slot patch

For the first iteration rectangular (2 x 0.5) shape slot is cut inside the geometry to shape Rectangular slot as shown in figure 2.

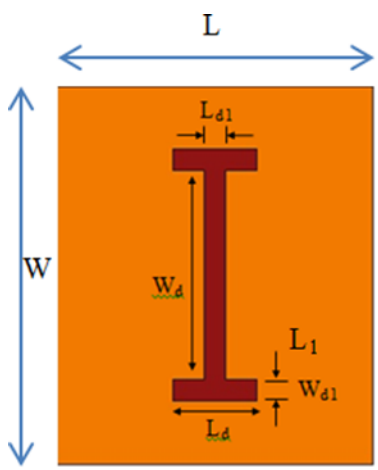

Fig.3 DGS

Parameters	Dimensions (mm)
Ld	4
Wd	10
Ld1, Wd1	0.5
LgxWg	15 x 18

Here we get better return loss than base shape and after application of DGS we further improved the return loss.

III. RESULT ANALYSIS OF PROPOSED WORK

Antenna Design	*Fl* (GHz)	*fh* (GHz)	*fr* (GHz)	Return Loss (dB)	Bandwidth Percentage
Base Shape	8.3093	8.6996	8.5044	-16.0499	4.58 %
8-Shape	9.9876	10.6757	10.3316	-27.4451	6.66 %
DGS Optimized	10.0004	10.6926	10.3600	-44.1210	6.68 %

IV. COMPUTER SIMULATION AND RESULTS

For the Simulation of RF part configuration, there exist numerous kinds of programming, for example, HFSS, CST, Devotion, Super NEC and so on. The structure is planned and reenacted utilizing HFSS reproduction programming. There full recurrence for which least return misfortune happens for different groups with increment in number of fractals since progressive cycles. Figure 4 demonstrates the Arrival misfortune versus recurrence for base shape. Figure 5 demonstrates the variety of VSWR versus recurrence for base shape. Comparative outcomes for progressive emphases are appeared in figure 6 to figure 9. It its saw that as the quantity of cycles are expanded; number recurrence groups likewise increment. (.O.Peitgen, H. Jurgens, and D. Saupe, Chaos,1992)

For the base shape, thunderous recurrence happen at 1.700GHz and return misfortune is-17.88 and transfer speed rate is 5.586. For first cycle additionally resound recurrence happens at 1.700GHz yet their transmission capacity

percentage and return loss increase to 7.83% and -25.9257 respectively. Similarly, for second iteration resonant frequency occurs at 1.700GHz. But return loss increases to, -35.07db and band width increases to 9.01825.

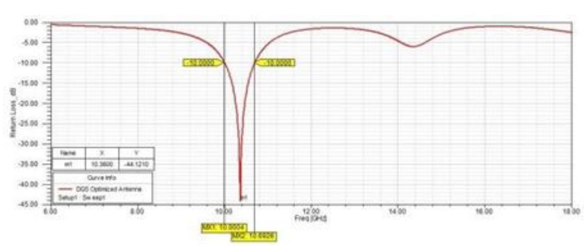

Fig.4 Return loss and bandwidth plot

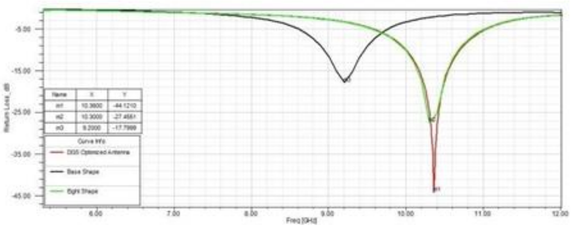

Fig.5 Return loss plot for base shape, rectangular slot and DGS optimized antenna

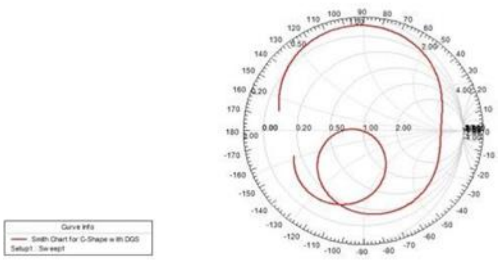

Fig.6 Smith chart of rectangular slot patch antenna

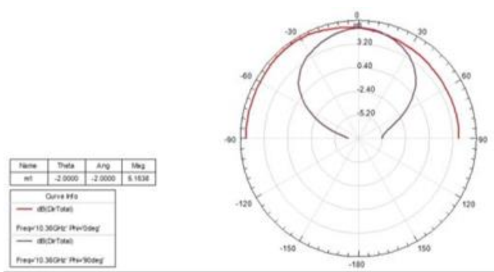

Fig.7 Radiation pattern of Rectangular slot patch antenna at 10.36 GHz

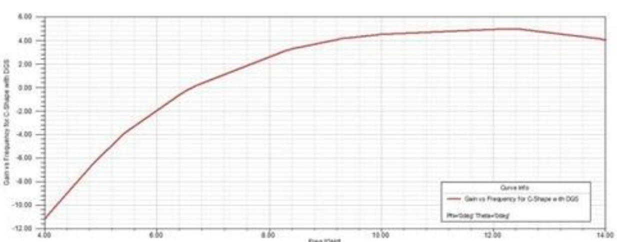

Fig.8 Gain V/s Frequency of rectangular slot patch antenna

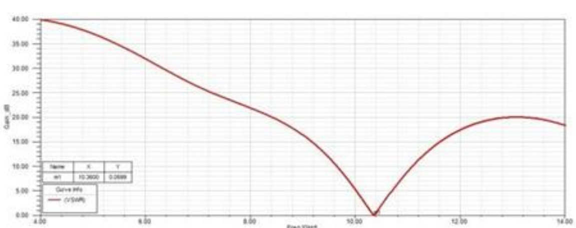

Fig.9 VSWR of rectangular slot patch antenna

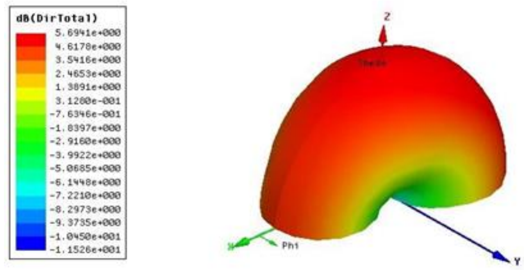

Fig.10 3D Polar plot of rectangular slot patch antenna at 10.36 GHz

V. CONCLUSION

In this paper, an rectangular slot has been designed with coaxial bolstering method utilized. At first rectangular shape fix is recreated and return misfortune bend is followed, at that point a rectangular state of specific measurement is expelled from the base shape such a way, that base shape changed over into rectangular slot then a surrendered ground structure is made. After finishing of the plan it is held under recreation to get wanted outcome. Here we show signs of improvement return misfortune than base shape and after utilization of DGS we further improved the arrival misfortune, at that point parametric investigation of different parameters of the proposed radio wire has additionally been displayed. We presumed that arrival misfortune increments to some esteem. The arrival misfortune plot of the proposed radio wire has been demonstrated that the reception apparatus is reverberated from 10.0002 GHz to 10.6926 GHz with the arrival loss of - 44.12 dB. In this way, the proposed reception apparatus can be utilized for beginner radio and satellite correspondences.

The proposed antenna shows the satisfactory gain in the desired frequency range. In this design we improved BW% up to 6.68 % from 4.48 %. i.e. (4.48 % BW was at base shape antenna and after optimization it increases to 6.68 %).

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