

Double Band Antenna Designing using Parallel Plate DGS

¹Ranjana Yadav, ²Prof. Ashish duvey

¹SRCEM, Banmore, India

²SRCEM, Banmore, India

Abstract – In this research paper author proposed a new DGS design to modify the antenna from single band to double band antenna. Initially the antenna was designed at 1.38GHz later in this paper, author proposed a new design of DGS to modify this antenna into double band. To achieve this very important band characteristic author proposed three parallel strips shaped symmetrical DGS in the ground plane. This symmetrical DGS on the other side of the patch increases the fringing field which consequently increased the parasitic capacitance. This coupling of patch and ground made the antenna a double band antenna

Keywords – Defected ground structure, patch, double band, return loss.

I. INTRODUCTION

Antenna is essentially a transducer, which work in as a part of a transmitting or accepting framework intended to emanate or to get electromagnetic waves. Use of a traditional reception apparatus constantly constrained since they are represented by the 'right hand govern' which decide how electromagnetic wave ought to carry on. Numerous speculations were displayed over rectangular microstrip fix reception apparatus and for their parameter change. Some of them were utilization of parasitic components [1], distinctive nourishing methods [2], metamaterial joining [3-4], and one of the significant misfortune was utilization of abandoned ground structure system [5], it isn't just simple to plan and shoddy in creation also. Not all that much figuring required while experiencing this procedure.

In recent years various applications of microstrip antenna came into existence like microwave and wireless communication system. In this way, microstrip radio wire is exceptionally appropriate to apply at different fields like satellite, military, restorative application and media transmission framework. Here in this paper creators are occupied with concentrate the execution of a rectangular fix when DGS is presented in the ground plane of the fix reception apparatus.

This research was conducted on the frequency of 1.38 GHz by designing a RMPA and then a highly inspirational parameter improvement technique which is defected ground structure technique was used. After using DGS technique in RMPA and applying a parallel plate shaped structure in ground plane, Antenna modified into double band while improving other parameters too.

DGS is a carved symmetrical or non-symmetrical fell setup imperfection in ground of a planar transmission line (e.g., microstrip, coplanar and conductor sponsored coplanar wave control) which bothers the shield current conveyance in the ground plane reason for the deformity in the ground.

II.CALCULATION

A new patch antenna has been proposed for the operating frequency of 1.38 GHz. Parameters were calculated by formulas listed in [6] and then an antenna was designed in CST simulation software and the simulation results were analyzed. Designed patch is shown in figure 1 and then in corresponding figures 2 and 3 simulation result were presented of patch shown in figure 1.

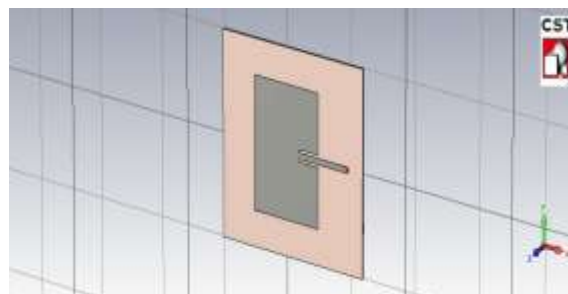


Fig. 1. Antenna at 1.38 GHz.

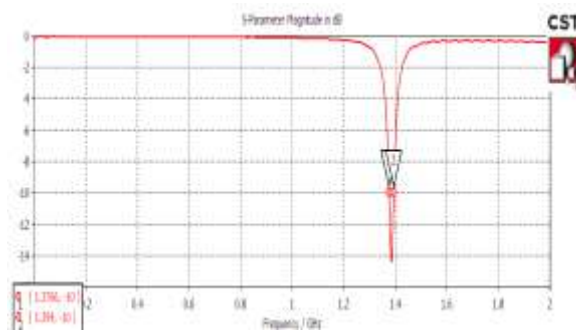


Fig. 2. Simulated result of patch antenna shown in Fig. 1 with return loss -14.1dB.

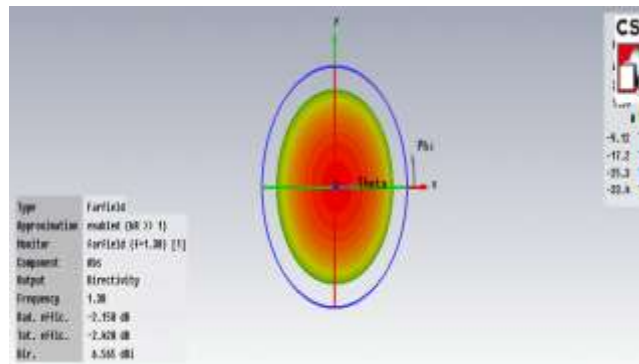


Fig. 3. Simulation result shows directivity, efficiency and radiation pattern.

Designed patch antenna was simulated and its result was presented in figure 1, 2 and 3 respectively. Simulated result shows return loss of -14 dB and directivity of 6.656dBi whereas the bandwidth was around 17MHz. These parameters are not satisfying the necessity so parameter change is attractive. To satisfy request DGS system was actualized, following is proposed DGS structure in figure 4 and relating figure demonstrates its reenacted comes about.

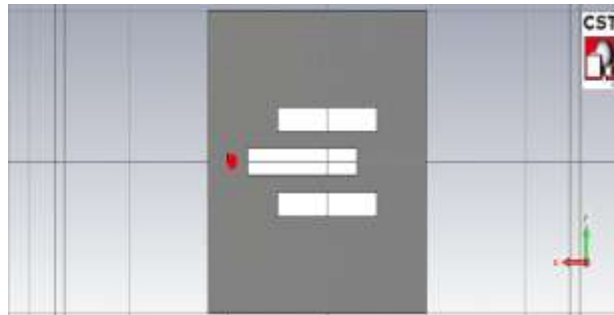


Fig. 4. Proposed DGS on the ground plane

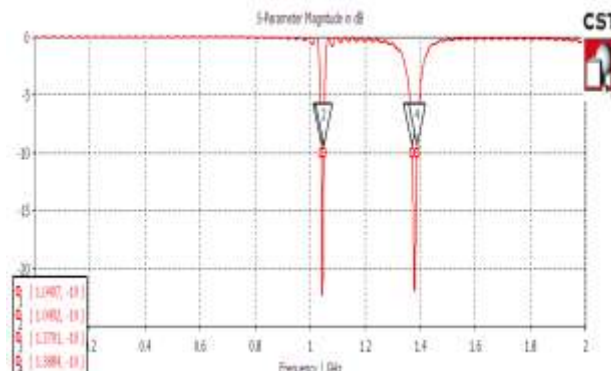


Fig. 5. This is the simulated result of design proposed on ground plane in figure 4, dip at 1.04 and 1.38GHz.

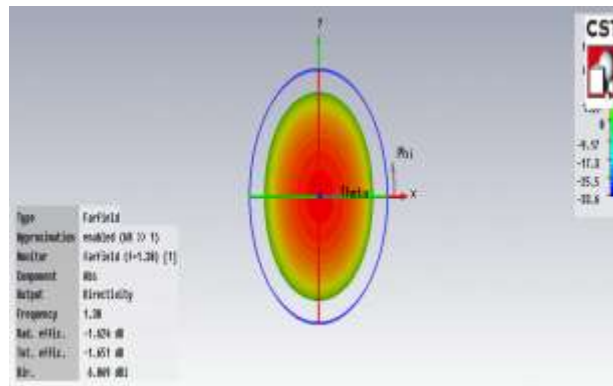


Fig. 6. This is the simulated result of design in figure 4, showing radiation pattern with efficiency and directivity.

III.RESULT

It has been observed by comparing the simulated results shown in fig. 2 & 3 (simulated result of patch antenna alone) & in fig. 5 & 6 (simulated result after incorporating DGS) that antenna is modified into double band. Efficiency, return loss, bandwidth increased too. These results are compared w.r.t the parameter variation. Comparative chart is shown below in table 1.

TABLE I: COMPARISON CHART

S. no.	Parameters	Parameters of patch alone at 1.38 GHz	After DGS introduction At 1.38 GHz	After DGS introduction At 1.04 GHz
1	Return loss	-14.1dB	-22dB	-23dB
2	Bandwidth	17MHz	18.3MHz	8MHz
3	Directivity	6.565 dB	6.869 dB	6.746 dB

After the comparison it has been observed that the proposed DGS structure ameliorate the parameters and modify the bands, the proposed DGS method improves the return loss and convert the antenna into double band [7] .

IV.CONCLUSION

This proposed patch antenna was designed for the applications of L band. At first antenna was not altogether satisfying the prerequisite of the focused on applications however when a parallel plate DGS structure is actualized on the contrary side of fix in ground plane, a huge change is accomplished. Now antenna can radiate on two different frequencies [8-9] apart from radiating on single frequency before implementing DGS on ground plane.

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