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Modeling and Simulation of a Micro strip Antenna in Annular Geometry

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Abstract **–** Micro strip antenna has been widely developed over time due to its flexibility and easier to design. The aim of this work is the simulation of an Annular Micro strip Patch antenna using CST software (Computer Simulation Technology) in order to know its performance (Gain, the reflection parameter S_{11}, directivity, efficiency…). Adding slots to the initial patch was determined to improve the main factors of these characteristics.

Keywords – Annular Micro strip, Computer Simulation Technology (CST), The gain, The reflection Parameter (S11), Directivity.

I. INTRODUCTION

Computer Simulation Technology « CST » software is a tool used to designing and simulation antennas, due to its powerful electromagnetic modeling and simulation function. It can analyze a wide variety formats as CST EM studio, CST PCB studio and CST Design STUDIO….

II. MATERIALS AND METHOD

The advantages of the diversity of the CST software its ability to easily simulate all types of strictures in the required dimensions by providing a modeling interfaces.

The main window of the CST software is presented in figure.1.

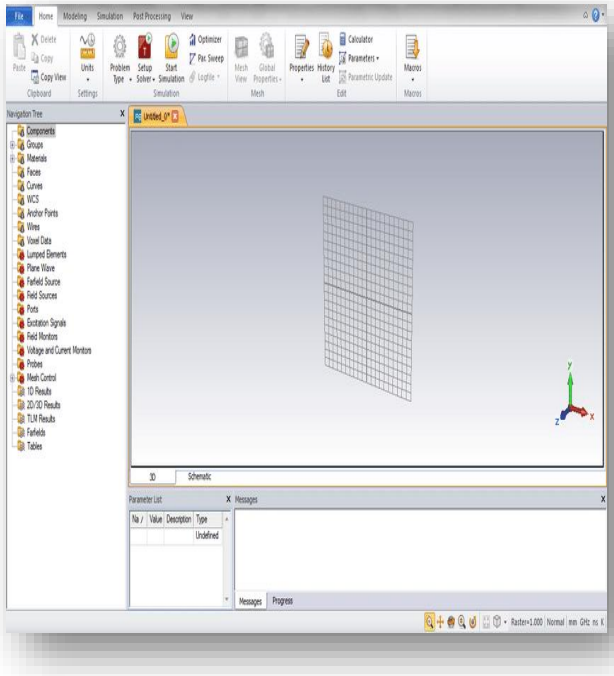


Fig. 1 CST software interface

On the left there is the navigation tree, from it we can access to the structural elements and the simulation results.

On the right there is the drawing plane which we will draw primitive structures. The location and the orientation of the drawing plane can be changed using various tools in the **view** menu.

We used in this work two kinds of materials namely:

The materials and methods used when conducting the study. The citations you make from different sources must be given and referenced in references.

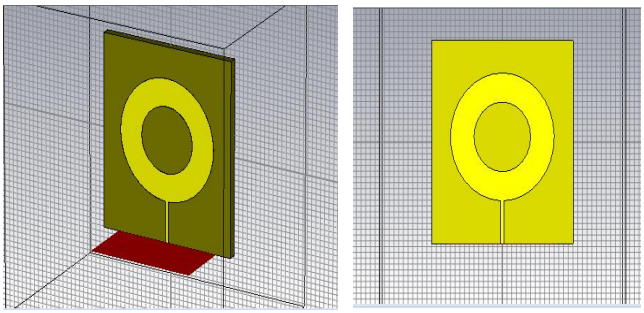
A. *Coper and Epoxy Resin*

In the CST Software program the Coper is found with several characteristics and designations namely; Annealed Copper, Optical Copper…

In our study we have used Annealed Copper and Epoxy Resin to our substrate. Its relative permittivity equal to 4.4.

B. *Antenna Geometry*

The structure of our wave planar antenna is shown in figure.2



a. Front view .b. 3D view

Fig. 2 Alimentation Geometry

The antenna is fed via a transmission line, having a width and a length ($W_f \times L_f$). The optimized shape and dimensions of the antenna and the ground plane have improved the impedance

The optimized settings are summarized in the table.1 given below.

Table 1. Dimensions of the proposed antenna

prameters	W_s	L_s	W_f	L_f	r_1	r_2	K_t	H_t	H_S
Values	30	35	08	7.5	11	6	7	0.035	1.6

III. RESULTS

The results of the simulation are presented regarding the reflection coefficient S_{11}, the Standing Wave Ratio 'VSWR' and the Gain. Varying the radiuses of the patch as presented in table.2 below.

Table 2. Radiuses of the patch

prameters	r_1	r_2	r_3
Values (mm)	11	6	12

- *Voltage Standing Wave Ratio 'VSRW*

The simulated VSWR of the propose antenna is showed in figure.3 and the adaptive frequency range is 2 to 12 GHz.

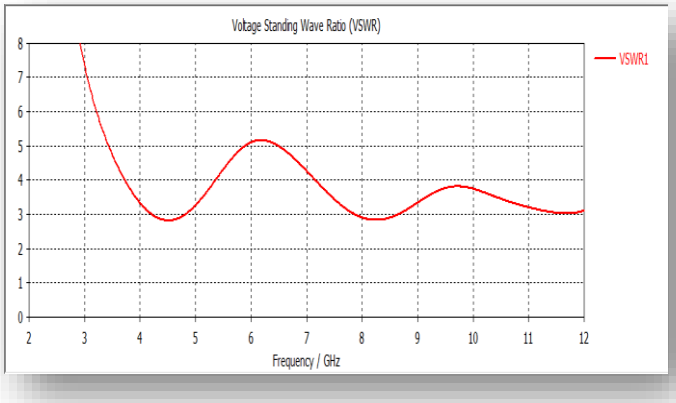


Fig. 3 Voltage Standing Wave Ration VSWR

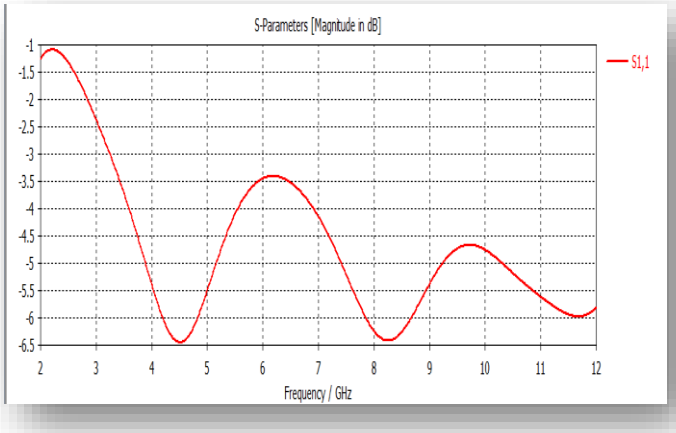


Fig. 4 Reflection Coefficient S_{11} for 7.85GHz

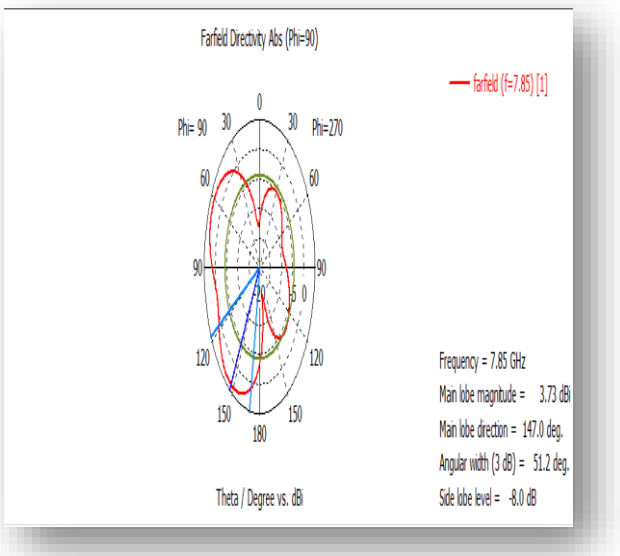


Fig. 5 Directivity for 7.85GHz (p_i=90)

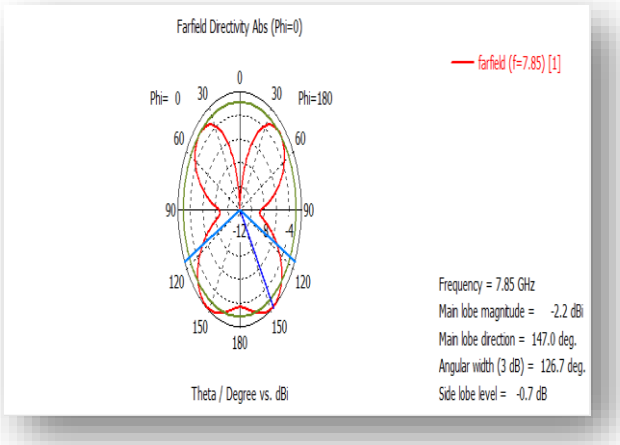


Fig. 6 Directivity for 7.85GHz (p_i=0)

IV. CONCLUSION

The simulation results under CST software showed that the proposed printed antenna has a wide range of operating frequency 7,85GHz. Before designing the air gap we achieved 73 % and more 97 % with the air gap (excellent efficiency).

The air gap has a great significant impact on system performance antenna.

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