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Shifting radiation by 90º phase by alternatiive parllel plate reflectors and enhancing radiationg by EBGS

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Abstract: We have seen the utilization of EBGS in several ways and one of the main property is it can megitate surface waves. When the band of EBGS and proposed antenna are tuned together it have either constructive or destructive property according to the radiation phases. In this paper we are taking a monopole antenna of hight 3.16 cm and it is filled with pec material . For enhancing its radiation into opposite direction the EBGS placed at –X direction. The alternative parllel reflectors are placed along side of EBGS in both +Y and –Y directions, and the results are illustrated based on how these parllel plate reflectors works to shift the radiation.

Keywords: EBGS, Enhancement of radiation, parllel plate reflectors, shifting radiation, perfect Electric Conductor. PPR – parllel plate reflector

I. INTRODUCTION

By the recent devolopments and tecnology improvements there is vast increase in need of variety applications in mobile and wireless communications. Especially the need of utilization of radiation from antenna in proper way and to over come the basic limitations of antenna like narrow BW, low radiation, compact size and low cost. Now a days the EBGS are used especially to reach the new trends and in over coming the limitations of microstrip antennas for that these EBGS, HIS, AMC are used in several ways. Basically these structures will supress the propagation of surface waves which inturn improves the performance of antenna. In this paper the idea is to steer or shift the radiation one side to another side while enhancing the antenna radiation.

II. DESIGN METHODOLOGY

The EBGS of dimesions 3.16× 10.05cm and via hight of 0.5cm and patch the dimesions of 1.4× 1.4cm is used and to parllel plates which are having same size of 3.16×10.05cm are taken and PEC is applied alternatively. A monopole antenna of 3.16cm is analysed by this arrangements. The basic designs are shown in the following fig [1]. The entire structure is designed and simulated by using Ansoft HFSS software and the results are presented. The monopole antenna is used for its basic omni directional radiation pattern. The monopole antenna is designed at 2GHz frequency the operating freqruncy may change when it is subjected to EBGS and parllel plate reflectors. Here the idea works only the parllel plates are active one after another. i.e , when right side parllel plate is on left side parllel plate is off vice versa.

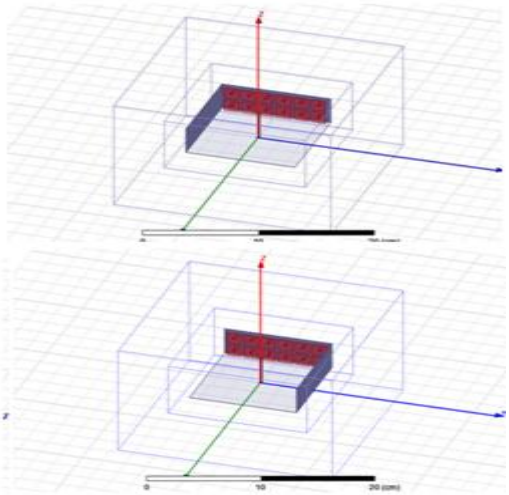

Fig [1] proposed Designs a) reflector left side b) reflector right side

III. SIMULATED RESULTS

A) Return loss

The returnloss of designed antenna is obtained almost same for the both designed antennas and it is -25.8502db when right side parllel plate reflector is on and -25.5357db when left side parllel plate is on. But basically the design monopole antenna only gives return loss of -14.7752db when simulated this results shows that the presence of EBGS reduces the return loss by supressing the surface wave propagatin so that the antenna performance is improved and also it improves the band width of antenna to over come the

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narrow BW limitation. The return loss curves are shown in the following fig [2]. And it shows the comparitive analysis when alternative parllel plate reflectors are acted.

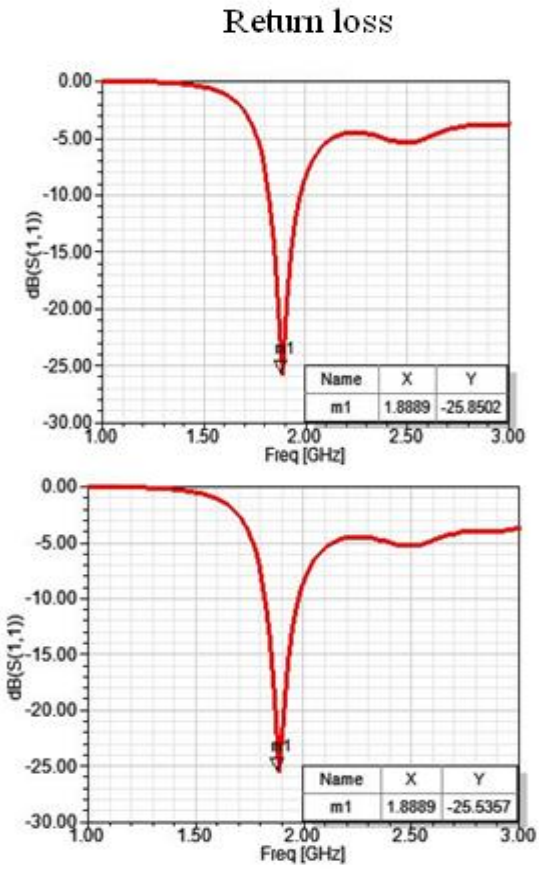

Fig [2] return loss vs frequency curves a) for left side PPR for right side PPR

From the above figure we can say that for both analysis the operating frequency is same and it is 1.8889GHz.

B) Radiation pattern

For the better understanding of steering or shifting of radiation pattern which is the basic concept for this design we shown the radiation pattern for phi=0degree and phi=90degree.firstly for the left side both 0degree and 90degree radiation pattern curves are in right side overlapped and in the second curve for right side parallel plate reflection it is seen that the radiation at phi=90degree is shifted to left side over a phase of 90degree. And the radiation pattern curves are shown in below figure [3].

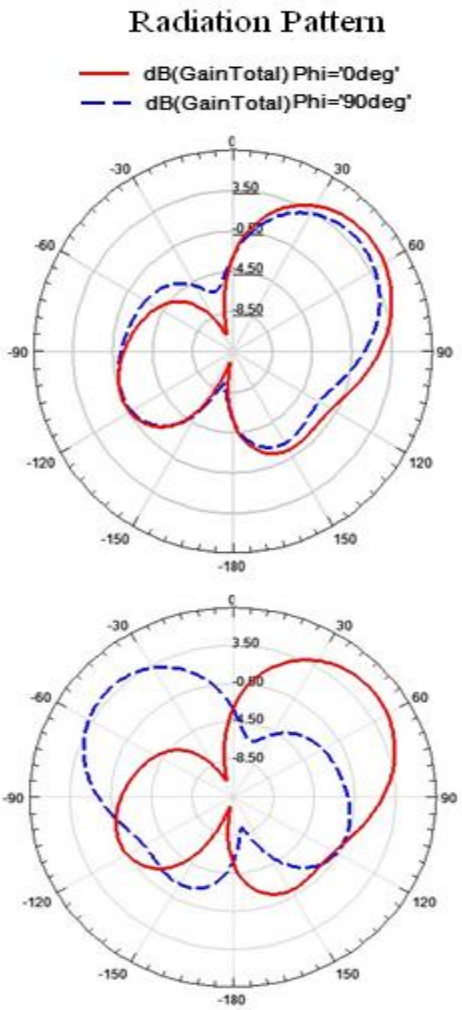

Fig [3]. Radiation pattern curves in phi 0 and 90 degrees for left and right side PPR's

C) Gain

The gain of the antenna which is taken from top view to know the gain in desired direction is represented in the following figure [4].the total gain is obtained as the energy constructed or mostly distributed along right side of phi-axis for left side parallel plate reflected and vice versa both the total gain is almost same for both about 6dB.

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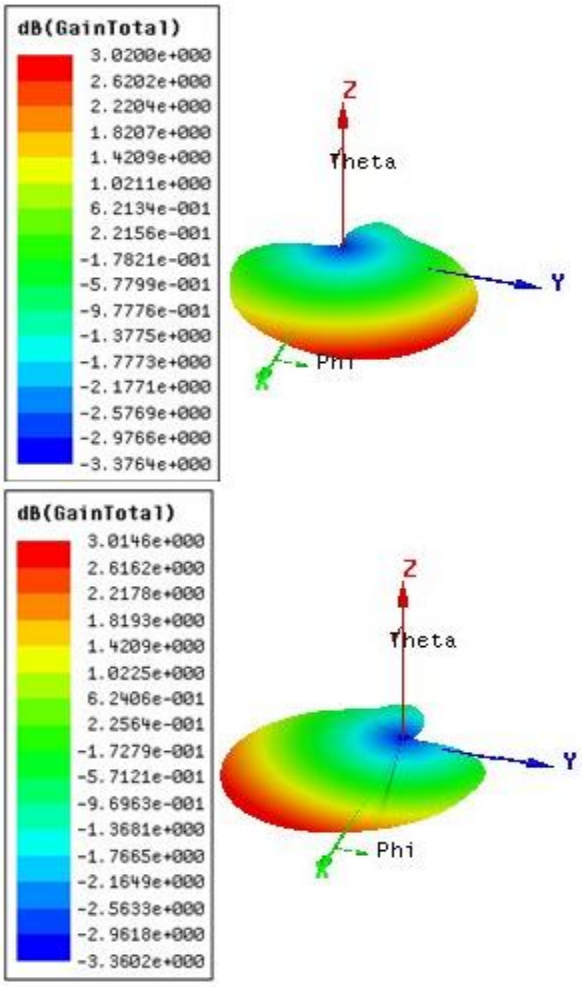

Fig [4]. Gain in top view for both left and right side PPR's.

D) *Gain in 3D*

The gain in 3D curves are shown in the following figure [5] and their pattern are same as gain in top view by the both figures we can explain that when left side parallel plate is active the energy is reflected to the right side and when the right side parallel plate reflector is on the energy is shifted to left side of the antenna. This is how we direct the antenna radiation to the desired area.

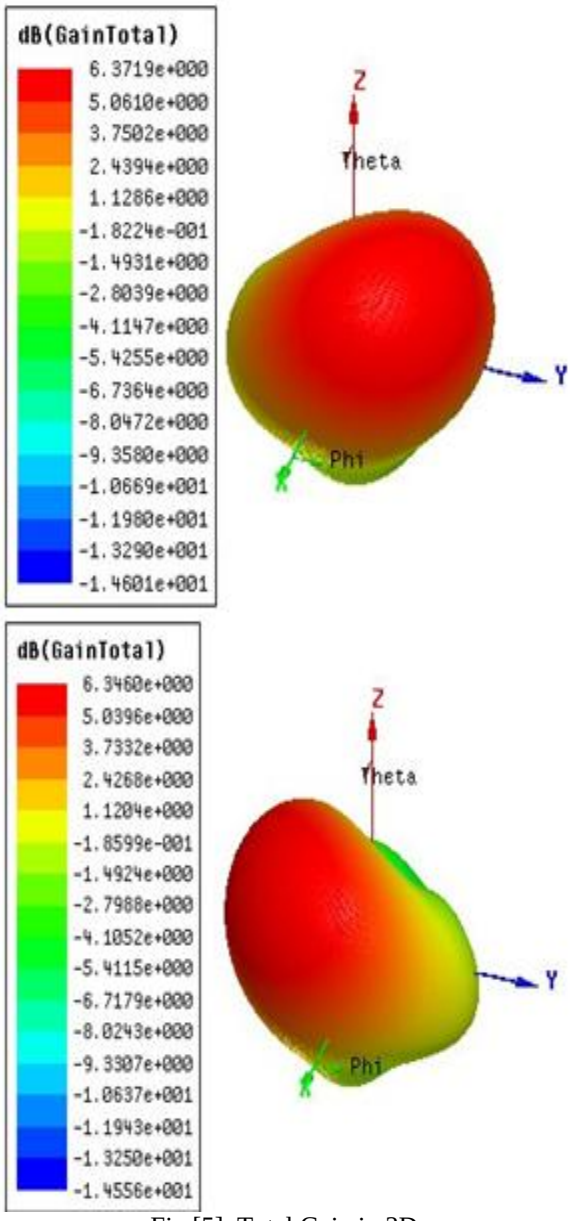

Fig [5]. Total Gain in 3D.

E) *Antenna parameters*

Here some antenna parameters values are illustrated in the following table [1]. By the table we can say that the simulation produces almost same values for both the designs.

Quantity	Value	
Max U	0.344159(W/sr)	0.342061(W/sr)
Peak Directivity	4.31682	4.29765
Peak Gain	4.33698	4.31117
Peak Realized	4.32493	4.29856

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Gain		
Radiated Power	1.00188(W)	1.00021(W)
Accepted Power	0.997221(W)	0.997076(W)
Incident Power	1(W)	1(W)
Radiation Efficiency	1.00467	1.00315
Front to Back Ratio	5.00778	4.97241

Table [1]. Antenna parameters

IV. CONCLUSION

The radiation pattern distribution is major impact in communication this method will enable us to utilize the radiation of the antenna more effective way it is also possible by providing the parallel plate reflectors at angles or by rotator them in required manner can enable us to steer the radiation in particular parts.

REFERENCES

[1].C. BALANIS, ANTENNA THEORY, ANALYSIS, AND DESIGN 2ND ED., JOHN WILEY AND SONS, NEW YORK (1997).

[2] C. Balanis, Antenna theory, Analysis, and Design 2nd ed., John Wiley and sons, New York (1997).

[3] J. Doondi kumar , "Analysis of Monopole Antenna by Placing High Impedance Absorber Surface at one Side" /Volume-2Number-1PP- 317 321.pdf

[4] J. Doondi kumar , "Design and Analysis of C0-axial Feed Rectangular Patch Antenna on High Impedance Surface" /Volume-2Number-1PP-405-410.pdf.

[5] Yang, F. and Y. Rahmat-Samii, \Microstrip antennas integrated with electromagnetic band-gap (EBG) structures: A low mutual coupling design for array applications," IEEE Transactions on Antennas and Propagation, Vol. 51, No. 10, 2936{2946, Oct. 2003.

[6] D. Sievenpiper, E. Yablonovitch, U.S. provisional patent application, serial number 60/079953, filed on March 30,1998

[7] Sievenpiper, D. F., \High-impedance electromagnetic surfaces," Doctorate thesis, University of California, 1999.

[8] D. Sievenpiper, ―High - Impedance EM surfaces‖, Ph.D. Dissertation, University of California, Los Angeles, 1999.

[9] D. Sievenpiper, J. Schaffner, B. Loo, G. Tangonan, R. Harold, J. Pikulski, R. Garcia, "Electronic beam steering using a varactor-tuned impedance surface," *Dig. of Int. Symp. of Antenna and Propag. Soc.*, vol. 1, 8-13 July 2001, pp. 174-177.

[10] Sievenpiper, D, F., \Review of theory fabrication and applications of HIS ground planes," Metamaterials: Physics and Engineering, Explorations, Chap. 11, 287{311, Edited by N. En- gheta and R. Ziolkowski, Wiley Interscience, 2006

[11] Y. Kotsuka, M. Amano, ―Broadband EM Absorber Based on Integrated Circuit Concept‖, Microwave Symposium Digest, 2003 IEEE MTTS International, Volume 2, 8-13 June 2003 Page(s):1263 – 1266 vol.2.

[12] Yang, F. and Y. Rahmat-Samii, "Step-like structure and EBG structure to improve the performance of patch antennas on high dielectric.

BIOGRAPHY

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