Design of Micro Strip Patch Antenna

Namrata F. Ansari[1] Shruti Vinchure[2] Monika Yadav[3] Gavin Wagh[4] Yash Pandharkar[5]
[1,2,3,4,5]KJSIEIT,Sion-22

Abstract— This paper present design of microstrip rectangular patch antenna for 5.8GHz.The microstrip antenna has advantages because of which it make progress in recent years. In this paper we discuss micro strip antenna design at 5.8Ghz frequency using IE3D software.

Key words: Data Mining, Heart Disease Risk Factors

I. INTRODUCTION

High antenna directivity, required in space applications is usually achieved by using either parabolic reflector or line fed antenna arrays or by using reflect arrays. The parabolic reflector has the disadvantage due to its shape which comes as an obtrusion in space and mobile applications. Beside this there are mechanical problems and installation difficulties associated with parabolic reflector. An alternative to this is microstrip antenna which also have the disadvantage of low efficiency due to line losses and high cross polar radiation by the feed line network.

A. Designing Steps

Step 1: Calculation of the Width (W): The width of the Microstrip patch antenna is given by

$$W = \frac{c}{2f_o\sqrt{\frac{(\varepsilon_r + 1)}{2}}}$$

Substituting c = 3e8 m/s, r ε = 2.55 and o f = 5.8 GHz, we get:

W = 19.411mm

Step 2: Calculation of Effective dielectric constant (reff ε):

$$\varepsilon_{reff} = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2}\left[1 + 12\frac{h}{W}\right]^{-\frac{1}{2}}$$

Substituting r ε = 2.55, W = 19.411 mm and h = 1.5 mm we get:

ε reff = 2.8509

Step 3: Calculation of the Effective length (eff L):

$$L_{eff} = \frac{c}{2f_o\sqrt{\varepsilon_{reff}}}$$

$$\Delta L = 0.412h\frac{(\varepsilon_{reff} + 0.3)\left(\frac{W}{h} + 0.264\right)}{(\varepsilon_{reff} - 0.258)\left(\frac{W}{h} + 0.8\right)}$$

Substituting reff ε = 2.8509, c = 3e8 m/s and o f = 5.8 GHz we get: L eff = 15.31mm

Step 4: Calculation of the length extension (ΔL):

Substituting reff ε = 2.8509, W = 19.411 mm and h = 1.5 mm we get: ΔL = 0.7217

Step 5: Calculation of actual length of patch (L):

$$L = L_{eff} - 2\Delta L$$

Substituting L eff = 13.83mm and ΔL = 0.7392 mm we get:

L = 13.866mm

II. RESULT

A. Smith Chart

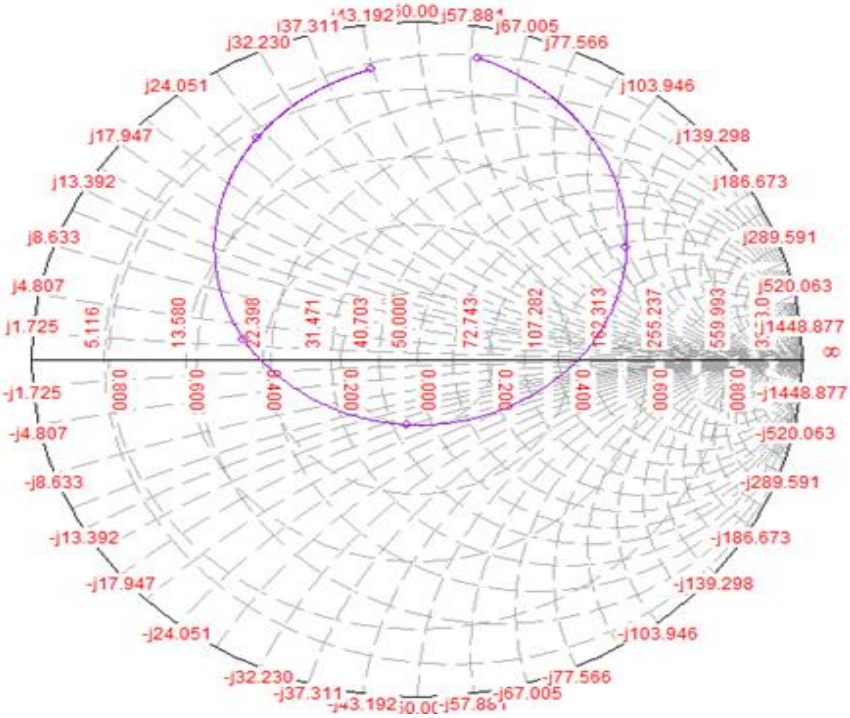

Fig. 1:

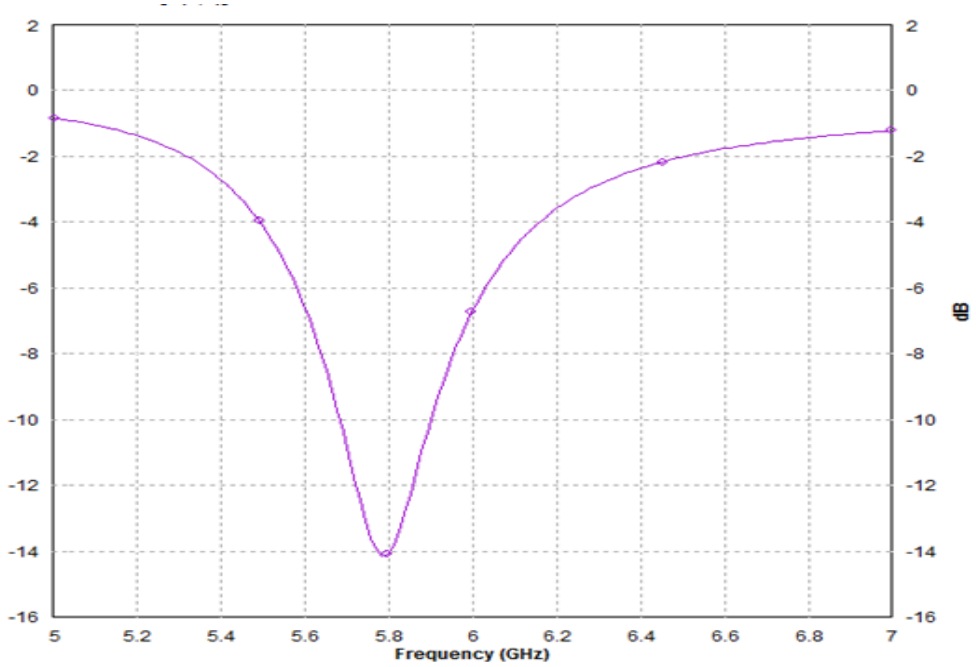

Fig. 2:

B. Db and Phase of S Parameter

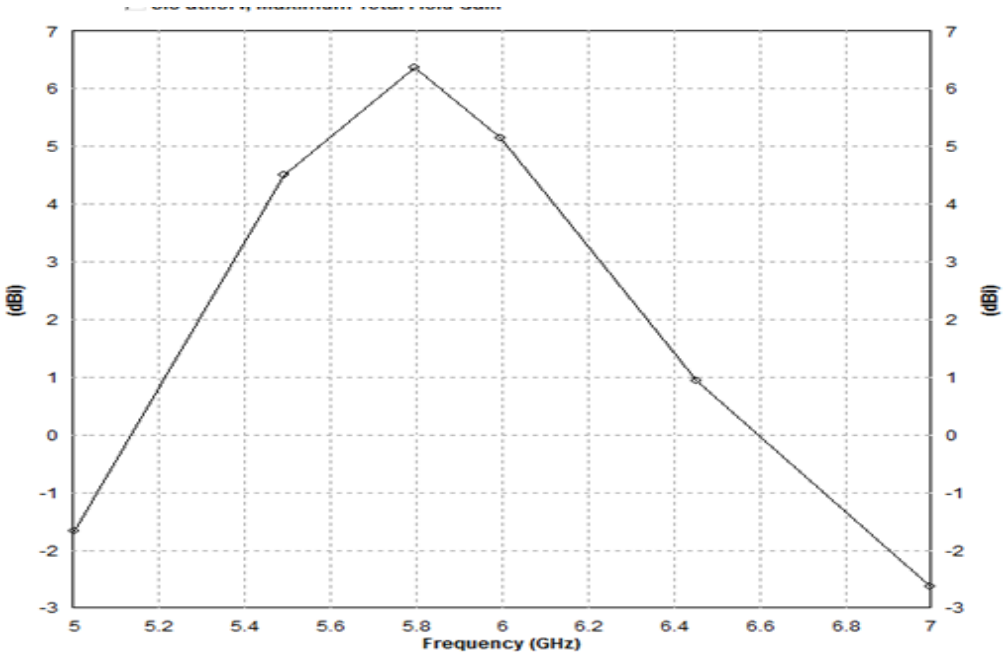

Fig. 3: Efficiency

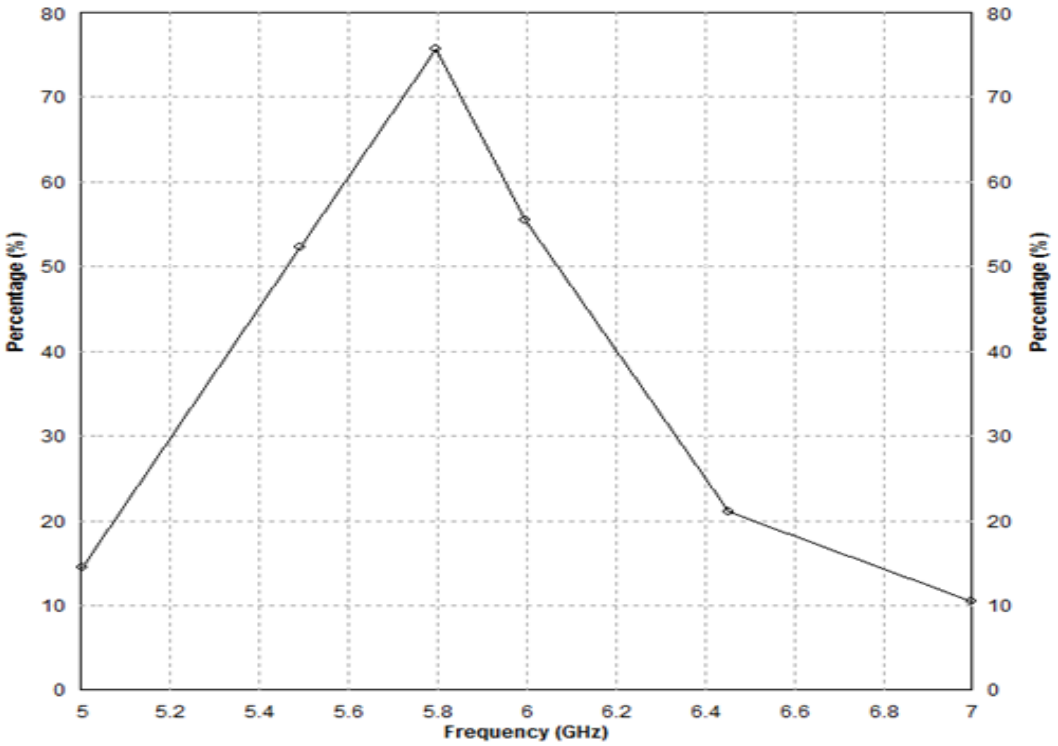

Fig. 4: Gain

III. CONCLUSION

The present state of work include design of rectangular microstrip Antenna for 5.8Ghz. The rectangular patch is designed using IE3D software with gain of 6.32 db and efficiency of 75%.

REFERENCES

[1] D M Pozar ,S D Targonski and H Syrigos ,"Design Of Millimeter Wave Microstrip Reflect Arrays" , IEEE transcript on Antennas and Propagation Vol. 45 No. 2 pp.287-295,Feb 1997.
[2] Girirsh Kumar and K P Ray , Broadband Microstrip Antennas, Boston: Artech House pp 291-293,2003.
[3] C A Balanis ,Antenna Theory Analysis And Design. New York : Wiley pp.260- 274,1982.

[4] J Huang and Ronald J Pogorzelski , "A Ka Band Microstrip Reflect Array With Elements Having Variable Rotation Angles", IEEE transcript on Antennas and Propagation Vol. 46 No.5 pp. 650-656 ,May 1998.
[5] R D Javor , Xiao-Dong Wu and Kai Chang,"Design And Performance Of A Microstrip Reflectarray Antenna", IEEE Trans. On Antennas And Propagation Vol. 43 No. 9 pp. 932-939,September 1995.
[6] Huang ,"Bandwidth Study Of Microstrip Reflectarray Antenna And A Novel Phased Reflectarray Concept", IEEE Int Symposium Antenna And Propagation , Newport Beach ,C A ,pp. 582-585,June 1995.
[7] P.N.Chine and G. Kumar, "Three dimensional, Efficient, Directive Microstrip Antenna Array," IEEE Int. Symposium Antenna And Propagation, C. A.,USA, June 2005
[8] M. Mukhopadadhaya et.al., " Switched Beam Array Antenna for Sectorized Optimum Power Distribtion into Discrete Localities of Rural Area," IETE Technical Review,Vol.23, No.5, pp293-296, Oct.2006.
[9] IE3D Version 11.5 , Zeland Software Inc. Fermont , C A ,USA , 2006.