Comparison between C- slot Micro strip Antenna and Slotted Equilateral Triangular Micro strip Antenna

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ABSTRACT

In this paper we show the triangular geometry of the microstrip patch is one of the most common shapes having a wide range application ranging from circuit elements to modern wireless antenna. In this paper we compare C- slot microstrip antenna an slotted equilateral triangular microstrip antenna. Recent survey of open literature shows interesting development of this patch as novel circuit element and antennas. In this paper, a very comprehensive review of the application and investigations on triangular micostrip patch (TMP) has been presented.

Keywords

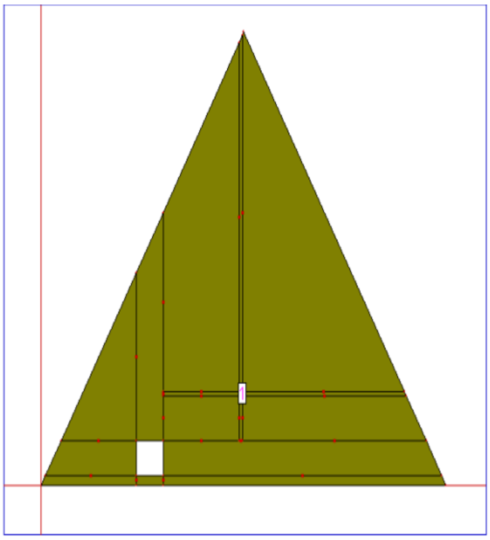
Ie3d, Matlab, microstrip

1. INTRODUCTION

Application of microstrip antenna is limited mainly because of their narrow impedance bandwidth [1]. Number of studies has been conducted to enhance the impedance bandwidth of equilateral microstrip antenna [2][3]. It is well known that the Sloted equilateral triangular microstrip patch is physically smaller than a C- slot microstrip antenna designed for the same frequency.

But the impedance bandwidth of C-slot microstrip antenna and their array are in the order of few percentages [4]. With considering to advantage of manufacturing of microstrip antennas with smaller surface, low price and high application on commercial and military has caused a lot of research and study to do on fabricating of several types of microstrip antenna size is smaller than rectangular patches therefore Microstrip antennas are popular and are getting increased attention due to their excellent advantages such as small size, light weight, robust construction, ease of integration into mobile handsets, reasonable radiation efficiency and gain[5]. Among the various shapes of microstrip patch antennas, the rectangular, the circular, and the annular-ring have been studied extensively. In contrast, the equilateral triangular patch has been the subject of only a handful of investigations. However, owing to the advantage of having smaller patch size at a given frequency, as compared to square and circular microstrip antennas, some related designs with a triangular microstrip antenna have recently been demonstrated [1][4]. Nowadays, researchers are interested in the design and development of compact microstrip radiating elements [5]-[6]. Embedding a cross-slot of equal slot lengths in the triangular patch was used to obtain compact antenna with size reduction up to about 22% [7]. In this paper, we see the comparison between sloted equilateral triangular microstrip antenna and C-slot microstrip antenna. location of feed point (14.78,5.25).

Description of Antenna Geometry



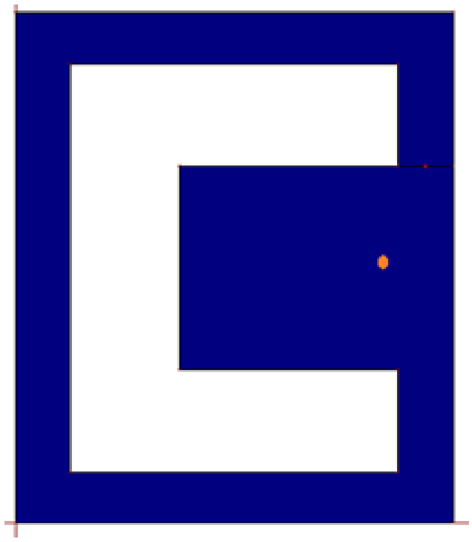


Fig: 1. the geometry of slotted equilateral triangular and C-slot microstrip antenna.

The impedance bandwidth is calculated using the formula,

$$BW = \left[\left(\frac{1}{F_C}\right) * (F_H - F_L) \right] * 100\%$$

Where, f_H and f_L are the higher and lower cut-off frequency of the band, respectively, when is return loss becomes -10 dB and f_c is the center frequency of this band.[8][9] For calculating the gain, the power received (p_t) SETMSA, and power received (p_s) by pyramidal horn antenna are measured separately. With the help of these experimental data gain (G_T) in dB is calculated using the formula.[8][9]

$$(G_T)_{dB} = (G_S)_{dB} + 10\log\left(\frac{P_t}{P_s}\right),$$

Where, G_S is the gain of pyramidal horn antenna.

The telemetry and communication antennas on missiles need to be thin and conformal and are often in the form of microstrip sloted equilateral triangular antennas.

Advantages and Disadvantages

- Light weight and low volume.
- Low profile planar configuration which can be easily made conformal to host surface.
- Low fabrication cost, hence can be manufactured in large quantities.
- Supports both, linear as well as circular polarization
- Can be easily integrated with microwave integrated circuits (MICs).
- Capable of dual and triple frequency operations.

2. SIMULATION RESULTS

In this section, simulation results are presented for the geometry shown in Fig.1. Paameters of designed triangular patches as it will be shown in table1.

COMPARISON	C-SMA	SETMSA
Dielectric constant	4.2	4.2
Substrate thickness	1.6mm	1.6mm
Loss tangent δ	0.0013	0.0013
Location of feed point	(14.78,5.25)mm	(14.78,5.25)mm
Return loss	-27	-38
Length of geometry	30mm	30 mm

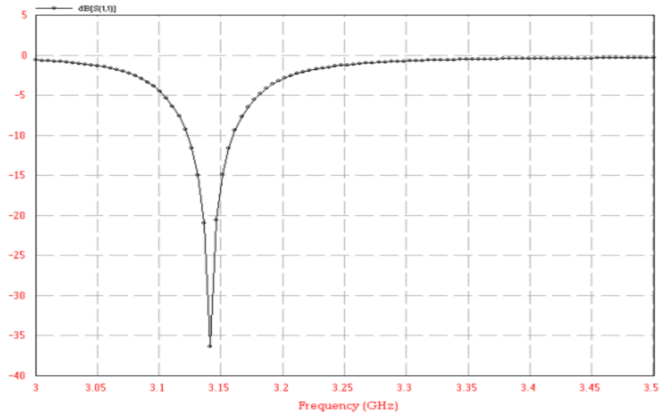


Fig.2: Retun Loss vs Frequency plot of probe feed on Ie3d,(C-SMA)

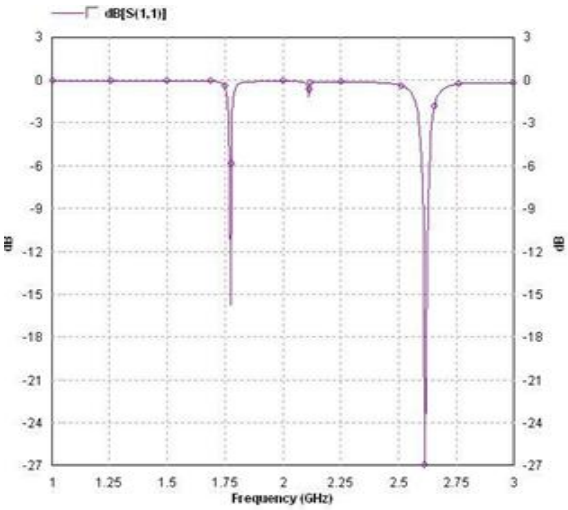


Fig.3: Retun Loss vs Frequency plot of probe feed on Ie3d,(SETMSA).

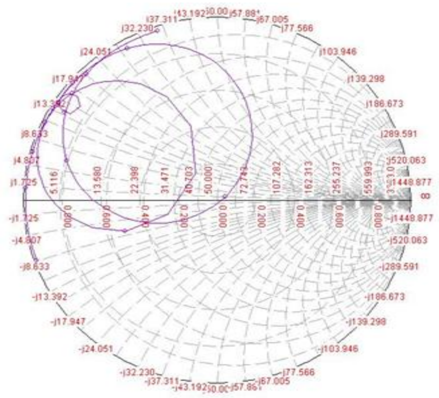


Fig.3: Smith chart display of simple ETMSA

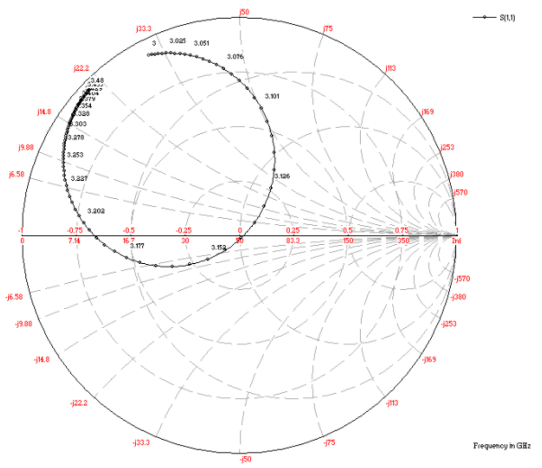


Fig.4: Smith chart display of SETMSA

3. CONCLUSION

It is observed that probe feed and slotted probe feed antennas arrays designed and simulated ok IE3D. It is seen that the return loss of slotted equilateral triangular microstrip antenna is less compared to C- slot microstrip antenna. The slotted antenna is suitable for implementing compact arrays, thus achieving even higher gain and good LP over a large bandwidth.

4. REFERENCES

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