

ANALYSIS OF ELLIPTICAL PLANAR METAL PLATE MONOPOLE ANTENNA WITH DIFFERENT FEEDING STRIP LENGTH FOR UWB APPLICATION

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ABSTRACT

In this paper elliptical planar metal plate monopole antenna with different feeding strip length are presented. The proposed antennas were simulated using HFSS (HIGH FREQUENCY STRUCTURAL SIMULATOR). Simulation results and comparison for return loss (S11), gain, directivity are Presented and discussed over the UWB frequency.

Keywords - Feeding Strip Length; UWB Frequency; HFSS; Gain; Directivity

I. INTRODUCTION

With the rapid development of modern communication and semiconductor technologies, a wide variety of wireless services have been successfully introduced worldwide in the past few years. Ultra wideband (UWB) is one such technology, which promises extremely high transmission rates over a very short distance, high capacity and low power consumption. According to the regulation released by Federal Communications Commission (FCC), the UWB systems for indoor communication have been allocated to the frequency band of 3.1 to 10.6 GHz. In this paper the lengths of feeding strip, which is the gap between the monopole structure and the ground plane are studied.

The proposed antennas were simulated using HFSS (HIGH FREQUENCY STRUCTURAL SIMULATOR). HFSS is a commercial finite element method solver for electromagnetic structures. The acronym originally stood for high frequency structural simulator. It is one of several commercial tools used for antenna design, and the design of complex RF electronic circuit elements including filters, transmission lines.

II. ANTENNA DESIGN

The proposed figure of the Elliptical planar plate monopole antenna with the square ground plane on HFSS software is shown in figure 1. The dimensions of the Elliptical planar plate monopole antenna (i.e., major axis length = $2a$ and minor axis length = $2b$). a is taken equal to 26mm The ellipticity ratio is chosen as a/b 1.08, The proposed Elliptical planar plate monopole antenna is vertically mounted above the square ground plane structure of size 300*300 mm² is shown in figure 1. The Elliptical planar plate monopole antenna and single

feeding strip are integrated together. Feeding strip has a uniform width of 2 mm and a length varies from 1 mm, 1.5mm, 2mm and is connected to a centre of the Elliptical planar plate monopole antenna.

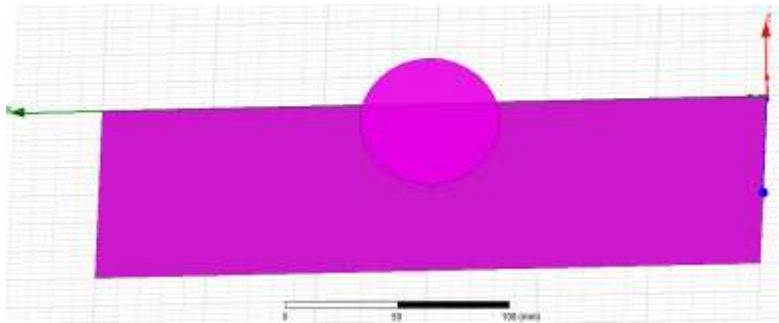


Fig 1- Elliptical Planar Plate Monopole Antenna

III. SIMULATION RESULTS

To design planar antenna HFSS is used-

Return loss-

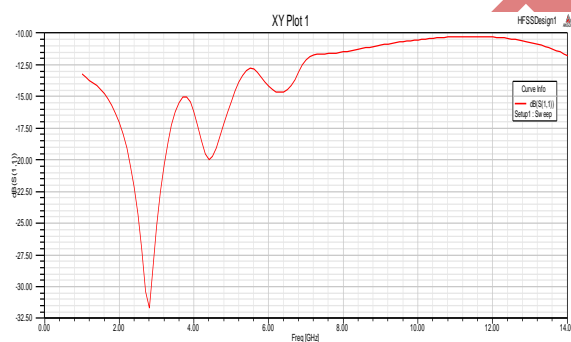


Fig 2 (A) - Elliptical Planar Plate Monopole Antennas with Feeding Strip Length 1mm. Antenna

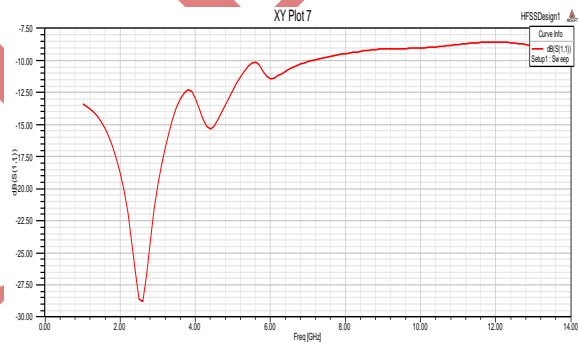


Fig 2 (B) - Elliptical Planar Plate Monopole Antenna With Feeding Strip Length 1.5 Mm.

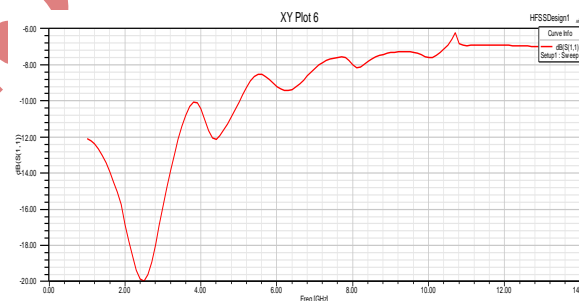


Fig 2 (C) - Elliptical Planar Plate Monopole Antenna With Feeding Strip Length 2 Mm.

Fig2. Simulated Results For Return Loss.

From figure(2) we can see Elliptical planar plate monopole antenna with feeding strip length 1mm. exhibits the bandwidth from 1 GHz to 14 GHz. Elliptical planar plate monopole antenna with feeding strip length 1.5mm. exhibits the bandwidth from 1 GHz to 7 GHz . Elliptical planar plate monopole antenna with feeding strip length 2 mm. exhibits the bandwidth from 1 GHz to 5 GHz.

Gain-

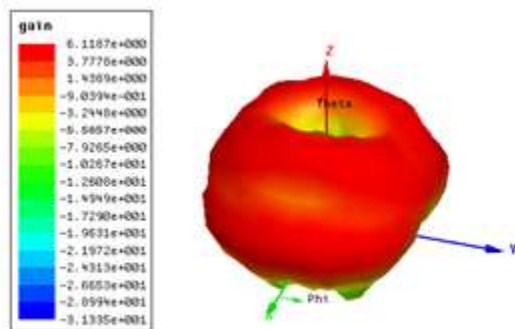


Fig 3 (A)- Elliptical Planar Plate Monopole Antenna With Feeding Strip Length 1mm.

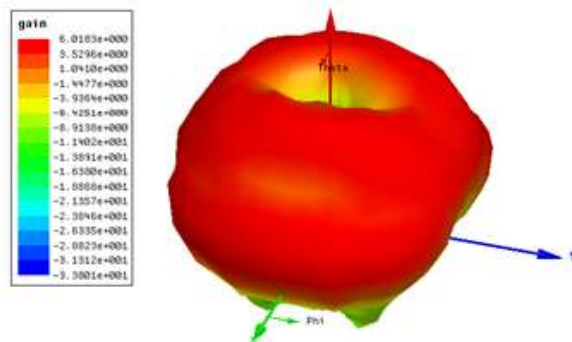


Fig 3 (B)- Elliptical Planar Plate Monopole Antenna With Feeding Strip Length 1.5mm.

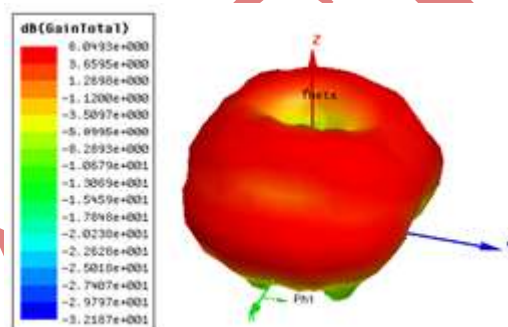


Fig 3 (C) - Elliptical Planar Plate Monopole Antenna with Feeding Strip Length 2 Mm.

Fig3. Simulated Results For Gain.

From figure (3) we can see that Elliptical planar plate monopole antenna with feeding strip length 1mm,1.5mm ,2 mm provide gain 6.11db,6.01db and 6.04 db respectively.

Directivity-

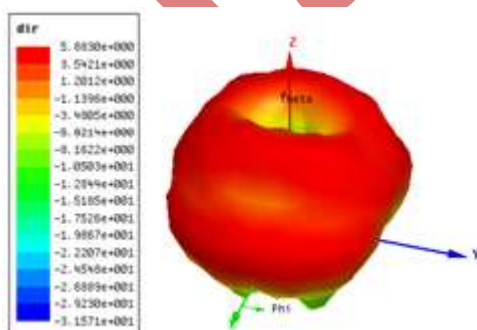


Fig 4 (A) - Elliptical Planar Plate Monopole Antenna with Feeding Strip Length 1 Mm.

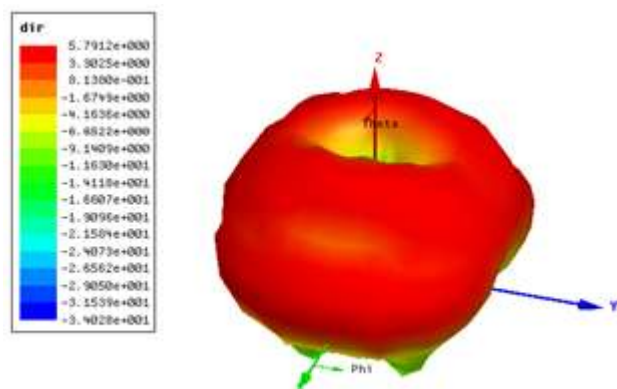


Fig 4 (B) - Elliptical Planar Plate Monopole Antenna with Feeding Strip Length 1.5 Mm.

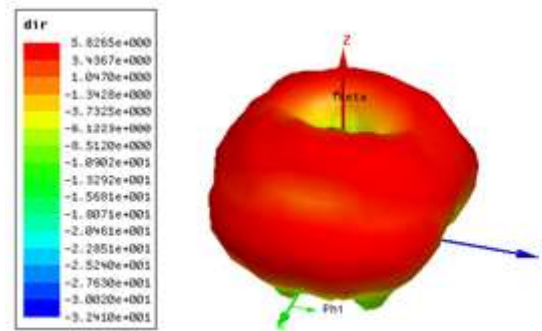


Fig 4 (C)- Elliptical Planar Plate Monopole Antenna With Feeding Strip Length 2 Mm.

Fig4. Simulated Results For Directivity.

From figure (4) we can see that Elliptical planar plate monopole antenna with feeding strip length 1mm, 1.5mm, 2 mm provide directivity 5.88dbi, 5.79dbi and 5.82 dbi respectively.

IV. CONCLUSION

New configurations of Elliptical planar plate monopole antenna on same square ground plane using different feeding strip length 1mm, 1.5mm, 2mm has been investigated. Elliptical planar plate monopole antenna with feeding strip length 1mm. exhibits the bandwidth from 1 GHz to 14 GHz. Elliptical planar plate monopole antenna with feeding strip length 1.5mm. exhibits the bandwidth from 1 GHz to 7 GHz. Elliptical planar plate monopole antenna with feeding strip length 2 mm. exhibits the bandwidth from 1 GHz to 5 GHz. Elliptical planar plate monopole antenna with feeding strip length 1mm, 1.5mm, 2 mm provide gain 6.11db, 6.01db and 6.04 db respectively. Elliptical planar plate monopole antenna with feeding strip length 1mm, 1.5mm, 2 mm provide directivity 5.88dbi, 5.79dbi and 5.82 dbi respectively. so Elliptical planar plate monopole antenna with feeding strip length 1mm is more useful for UWB application.

V. ACKNOWLEDGMENT

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