RESEARCH ARTICLE

OPTIMIZATION OF DUAL BAND MICROSTRIP ANTENNA USING IE3D SIMULATOR FOR C-BAND

[1]Dr. Anubhuti khare, [2]Puran Gour, [1]Rajesh Nema and [2]Teena Raikwar

[1]UIT Rajiv Gandhi Proudyogiki Vishwavidyalaya (State Technological University of Madhya Pradesh, India
[2]NRI Institute of Information Science and Technology College, Bhopal

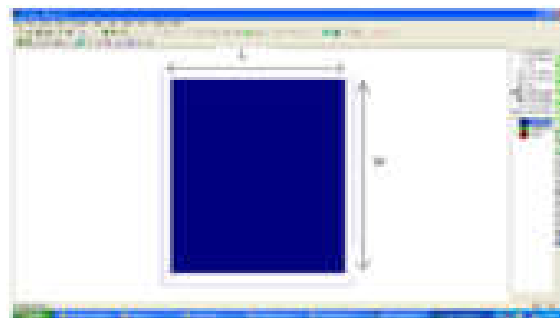| ARTICLE INFO	ABSTRACT
	In radar and space communication applications patch antennas have attracted much interest due to their compactness and dual-frequency operation. They are inexpensive to fabricate, light in weight, and can be made conformable with planar and no- planar surfaces. This paper presents the design of a dual-band micro strip patch antenna using IE3D for wireless communication .The antenna is designed as a patch with two slots. The method effectively obtains the geometric parameters for efficient antenna performance. The simple rectangular dual-band micro strip patch antenna is simulated with IE3D and MATLAB and their corresponding result is compared. We analyzed micro strip antenna in IE3D by finite moment of method. The proposed antenna design on different-2 positions of slots in geometry1,geometry2,geometry3 and analyzed result between 1GHz to 15GHz,When the proposed antenna design on a 125 mil RT DUROID 5870 substrates with dielectric constant of 2.33and loss tangent of .0005.

INTRODUCTION

Recent developments in communication systems such as the global positioning systems (GPS), Wireless local network (WLAN), vehicular Satellite communication and wireless communications often require antennas with compact size, low cost and capable of operating more than one band of frequencies. For these applications, new research motivations have evolved for design of dual band Microstip antenna [1-6]. One such proposed technique is the embedding of slots inside a Microstip antenna to produce dual frequency response. To achieve this, narrow slots are positioned parallel to the non-radiating edges of a rectangular patch. In recent years, many Electromagnetic Simulation software is available for design of Microstrip antennas. Among them, the one of the powerful electromagnetic simulation software is IE3D. Besides the optimization schemes viz. Random optimizer, Powell optimizer, Adaptive optimizer & Genetic optimizer available in IE3D.In this paper, IE3D is used to design dual band Microstip patch antenna and simulation and optimization results are presented.

II. DESIGN OF DUAL BAND MICROSTRIP ANTENNA (IE3D/MATLAB)

The antenna structure (Fig. 1) consists of a rectangular patch dimension W × L with two slots into one of the radiating

edges, and is excited using an inset planar feed. The structure consists of a rectangular patch antenna. Width (w)=800, Length (L)=700, Height(h)=125 mil, Dielectric constant= 2.33. In first step single patch rectangular microstrip antenna is design without cutting any slots.
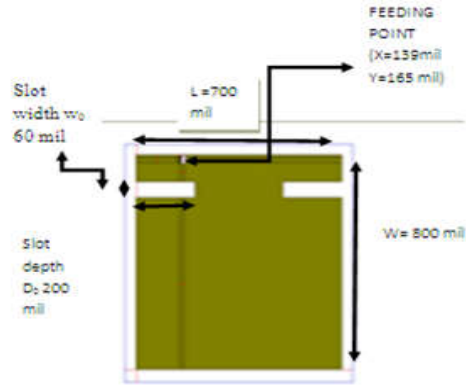

$$Zin\,(D_0) = \cos^2(\pi D_0 / L)\,Zin\,(D_0 = 0)$$

(1) The Proposed antenna has:-

Proposed Patch length = 700 mil,
Patch Width = 800 mil
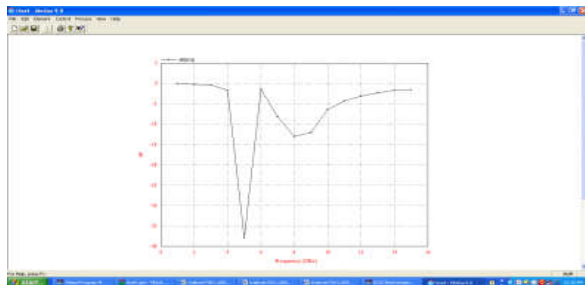Cut width =60miles, Cut depth = 200 mil   Feeding point=(x=160, y=780)

Corresponding author: anubhutikhare@gmail.com
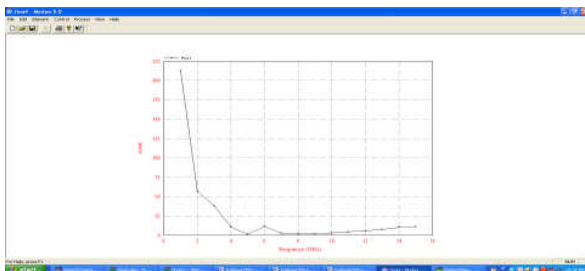
GEOMETRY- FIRST

RESULTS AND DISCUSSION FOR   GEO

GEMETRY FIRST

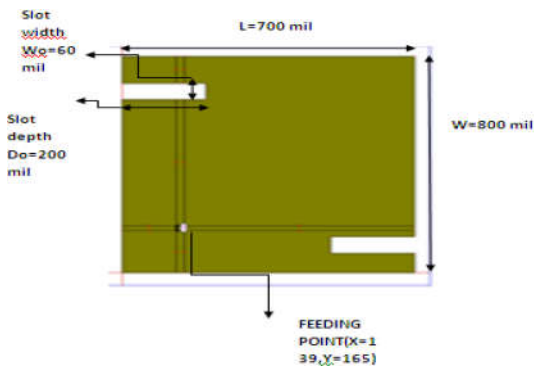1.Return loss VS Frequency (in GHz)

2. VSWR VS FREQUENCY (inGHz)

Return Losses= For proposed design the value of VSWR is effective between 1GHz to 15GHz, for this value return loss is minimum. At 5GHz return loss is -37.99dB and VSWR is 1.026, At 8GHz return losses is so minimum -13.09 and VSWR is 1.569
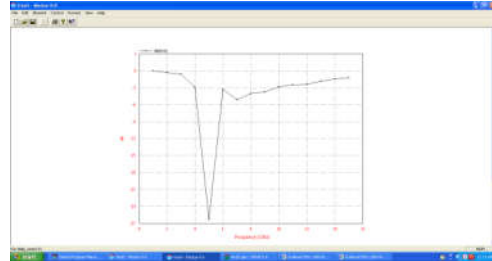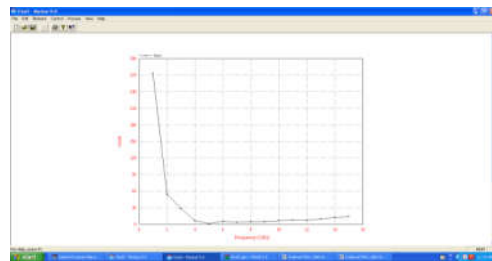
GEOMETRY-SECOND

(2) The Proposed antenna has:-

Proposed Patch length = 700mil,
Patch Width = 800 mil
Cut width =60mil, Cut depth = 200 miles Feeding point=(x=139, y=165)

RESULTS AND DISCUSSION FOR GEOMETRY SECOND

1. Return loss VS Frequency (inGHz)

2. VSWR VS FREQUENCY (inGHz)

Return Losses= For proposed design the value of   VSWR is effective between 1GHz to 15GHz, for this value return loss is minimum. At 5GHz return loss is -26.32dB and VSWR is 1.102, at 7GHz return losses is so minimum -5.138dB and VSWR is 3.479

(3) GEOMETRY-THIRD:-

(3)The Proposed antenna has:-

Proposed Patch length = 700 mil
Proposed Patch Width = 800 mil
Cut width =60mil,   Cut depth = 200 mil
Feeding point=(x=160y=781)

RESULTS AND DISCUSSION
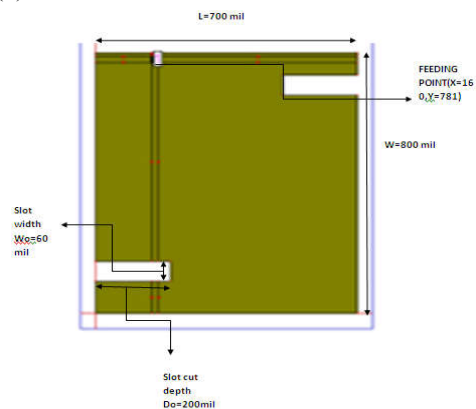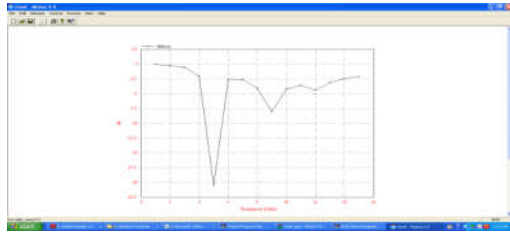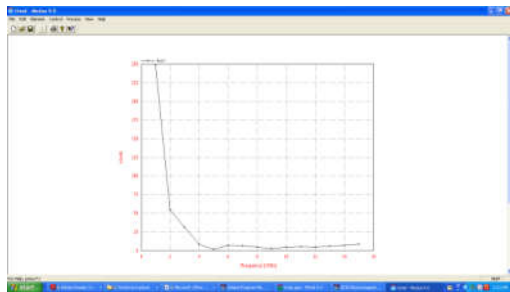
GEOMETRY THIRD

1. Return loss VS Frequency (in GHz)

2. VSWR VS FREQUENCY (inGHz)

Return Losses= For proposed design the value of VSWR is effective between 1GHz to 15GHz, for this value return loss is minimum. At 4GHz return loss is -18.05dB and VSWR is1.286, at 8GHz return losses is so minimum -4.859dBand VSWR is 3.668 III Compression between the Different Geometry of dual band microstrip antenna.

Table:-1

Dual band antenna Geometry	Dual band antenna Frequency [GHz]		Return Loss DB [S(1,1)]		VSWR	
	f1	f2	R1	R2	V1	V2
1	5	8	-37.99 dB	-13.09 dB	1.026	1.569
2	5	7	-26.32 dB	-5.13 dB	1.102	3.479
3	4	8	-18.05 dB	-4.859 dB	1.286	3.668

In this Table, f1 and f2 shows the frequency (in GHZ) of Dual band microstrip patch antenna, R1 and R2 shows the Return Losses (in dB), V1 and V2 shows the VSWR.

The inset feed and the two slots used to design the dual band rectangular microstrip patch antenna. The patch antenna was designed with operating frequencies of 5GHz and 8GHz, with a dielectric constant (ϵ_r) of 2.33.And fed with a 50Ω prob feeding. The optimized antenna is simulated using IE3D. The simulated GEOMETRY- FIRST shows a maximum return loss at 5GHz is -37.99dB and at 8GHz is -13.09dB. The first geometry antenna is very good for C-BAND communication

CONCLUSION

The design optimization of a dual slot patch antenna has been presented and discussed. It has been shown that with correct selection of slot dimensions and positions, a dual frequency response can be achieved. This design is obtained method, with IE3D. The use of a planar feed presents significant advantage as it allows easier integration with associated microwave circuitry and can also be easily extended for incorporation into antenna arrays.

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