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REVIEW ON MULTI-BAND MONOPOLE PATCH ANTENNA FOR PERVASIVE COMMUNICATION

Jyoti Tagde[1], Prof. Prashant Yadav[2]
[1,2] NRI Institute of Research and Technology, Bhopal (M.P)-462021, India.
jyoti_tagde@rediffmail.com

ABSTRACT

In rapid changing world there is a current scenario in wireless communication we deals with Multi-Band Monopole Patch Antenna which is used in modern communication system day by day.In this paper a comparative analysis of past few years is shown, that the leading technology that work on dual band monopole patch antenna is focused on wide bandwidth and notch characteristic. This review paper demonstrate some common techniques that are already used to design monopole patch antenna with wide bandwidth and dual-band notch and multi-band notch characteristic. In this paper we also discuss the basics of patch antenna and their various antenna parameters i.e. Gain, Return Loss, VSWR, Radiation Pattern, etc. for further research in this field.

KEY WORDS: Monopole antenna, multi-band antenna, band notched, and ultra-wide-band.

INTRODUCTION

Recently, in the modern communications system, one of the key issue is to the design the compact antenna by providing a wideband characteristics over the whole complete band, indeed, monopole patch antennas that allow to guarantee this request must have less complex configurations. It is necessary for an antenna to perform various function in a single antenna for this it is required to an antenna to have the characteristics of dual-band or multi-band notches.

LITERATURE SURVEY

1. Md. Imran Hasan *et al* (2013) [1] was proposed a Circular ring slotting technique of making compact microstrip rectangular patch antenna for four band applications. In this paper, for making compact patch antenna the circular ring slotting technique is used into the rectangular microstrip antenna. Slot antenna have been frequently used to obtain multi-resonance frequency. By this technique the antenna work in four frequency bands i.e. C-band, X-band, Ku-band, K-band. This frequency can be changedby varying the antenna size and geometricalmodification. This research is done with Taconic TLY-5 dielectric substrate with permittivity 2.2 and substrate height 1.588mm is used.

2. Debdeep Sarkar *et al* (2013) [2] was proposed a Design of a Novel Dual-band Microstrip Patch Antenna for WLAN/WiMAX Applications Using Complementary Split Ring Resonators and Partially Defected Ground Structure. In wireless communication system like Bluetooth, Wi-Fi, access point etc. there is a challenging problem of its narrow bandwidth, poor scan performance etc. To provide desired multi-band performance and specified radiation characteristics. In this research he proposed a single layer complementary split ring resonators(CSRR) loaded with microstrip patch antenna that are partially defected ground structure for enhancing the bandwidth in the WLAN and upper WiMAX frequency range and its dual band antenna satisfy WLAN and WiMAX or providing wider impedance bandwidth.

Its result shows the variation of peak-gain with respect to frequency for the proposed dual-band antenna. It is seen that in band-1 the average peak gain (1:8 dBi) is slightly less compared to that in band-2 (3:75 dBi).

3. Zaakri Safa *et al* (2013) [3] was research the Conception of Bi-band Rectangular Microstrip Array Antenna. In this research he studied that in microstrip antenna there is a major inconvenient of its narrow band. Simple configuration of rectangular microstrip antenna covers two bands, the K and Ku bands for operating a system of satellite communication. The configuration of the corner fed rectangular antenna, operate on double band. Its each configuration has its own function and its benefits over others. More benefits is achieved by adding some radiating element. For improving the operation of the antenna in both bands another shape, triangular and circular are used. These antennas are compact and miniature, their integration will be easier in the satellite communication systems. This shows the ability of microstrip antennas to adapt to all applications by applying a feeding techniques and design of radiation element.

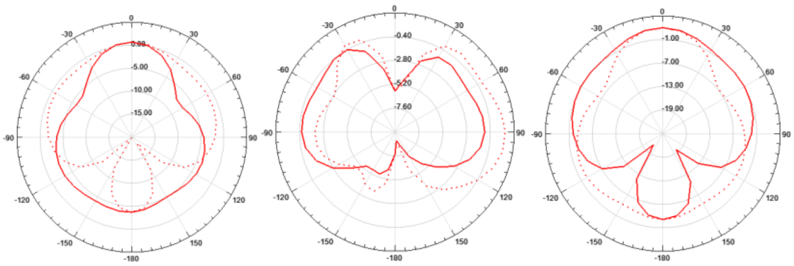

Fig. 1. Radiation patterns of antenna 1 in resonance frequencies: ─ E-plane, - - -H-plane

It is observed that the radiation characteristic of all proposed antennas is improved as multi-directional radiation to unidirectional, the radiation patterns of all frequencies of Ku and K bands of antenna 4 are situated in one side. At all resonant frequencies, the radiation patterns show broadside radiation characteristic.

4.M.Gopikrishna *et al* (2009) [4] was proposed the Design of a Compact Semi-Elliptic Monopole Slot Antenna for UWB systems . The author finds impedance bandwidth from 2.85 to 20GHz and the gain across the entire operating bands, and stable radiation pattern, and this also minimize the distortion to the transmitted and received pulses.

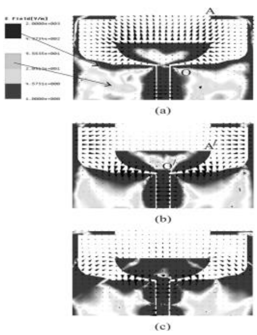

Fig. 2. E-field distribution on the conductor (Intensity) and aperture (vector) at

(a) 3.2 GHz, (b) 8.5 GHz, and (c) 12 GHz.

The vector distribution of the aperture field is also shown in Fig. 2. In the designing of this antenna proposed in communication system, the first resonance is designed to fall in the lower UWB (3.1–5.1 GHz) and the second resonance in the upper UWB (5.825 10.6 GHz).

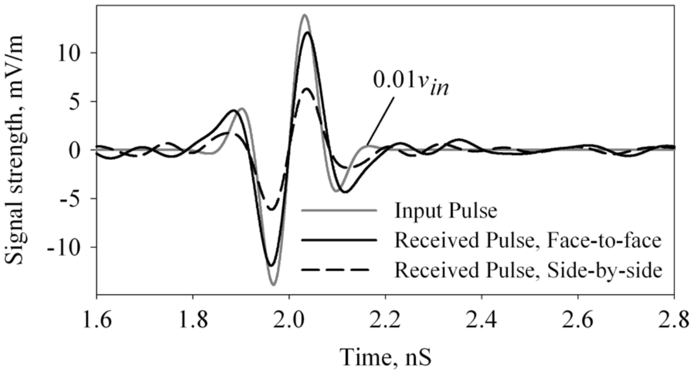

Fig.3. Input and received pulses.

The input and received waveforms for the face-to-face and side-by side orientations of the antenna are shown in Fig. 3. For easy comparison with the received waveforms, the input pulse is scaled by 0.01 in the figure.

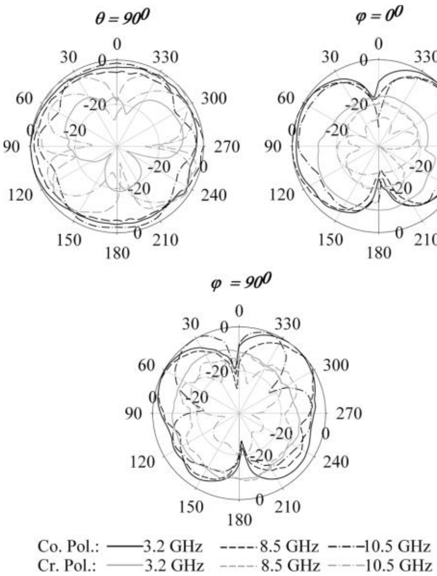

Fig. 4. Radiation patterns of Antenna 2 along (a) X-Y (b) X-Z (c) Y-Z planes.

Radiation patterns of the antenna in the X-Y, X-Z and Y-Z planes for three different frequencies are shown in Fig. 4. The patterns are stable throughout the band and resembles that of a monopole; bidirectional in the E-planes (Y-Z and X-Z) and omnidirectional in the H-plane (X-Y).

5.Soubhi Abou Chahine *et al* (2009) [5] was prepared A Modified Circular Disc Monopole Ultra Wide Band Antenna which covers a very large band from 1.5 to 15 GHz It has been shown that the performance of this antenna in terms of its frequency domain characteristics is mostly dependent on the patch radius, ground plane width and tapering the feed line. It is demonstrated by simulation that the proposed antennas can yield an ultra-wide bandwidth, and that the radiation patterns are nearly Omni-directional over the entire 10 dB return loss bandwidth. It is seen that, the simulated H-plane patternsare omni-directional at lower frequencies (2.4 and3 GHz) and is near omni-directional at higher frequencies (6.5 and 10.6 GHz). The frequency is increased, slightnotches start to form and pattern shows more directionality around 105 º and 160º in the simulated E-plane patterns.

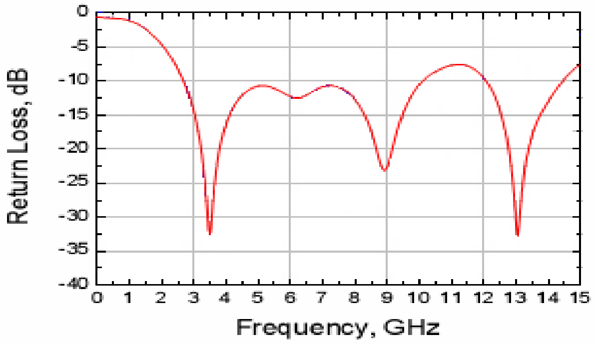

Fig. 5: Return Loss for Circular Disk Monopole (initial design)

6. Horng-Dean Chen (2008) [6] has design Compact Broadband Microstrip-Line-Fed SleeveMonopole Antenna for Digital television(DTV) Application and Ground Plane Effect. In this Paper it is studied the design of the monopole into a compact structure is applied for the size reduction. By properly selecting a length and spacing of the sleeve. Its results shows the reduction of antenna's size as well as it provide a wide range of bandwidth with a good impedance matching covering the whole DTV band.

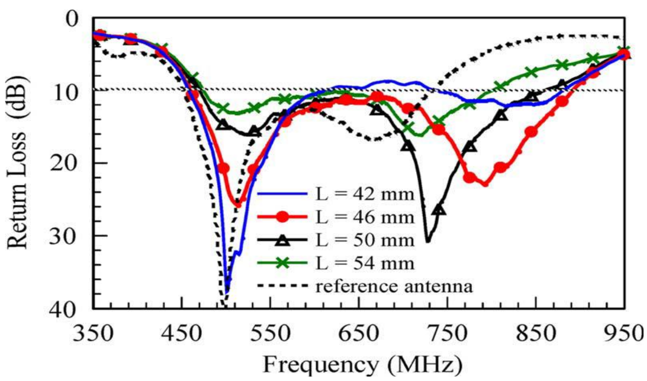

Fig. 6. Measured return loss for the proposed antenna with various sleeve lengths (L). The parameters of the reference antenna are h=180mm, s=3mm, l=72mm, and g=60mm

To demonstrate the effect of the sleeve length on the impedance bandwidth of the proposed antenna, the measured results of the return loss for antennas with various values of are shown. For comparison result of the reference antenna is also shown in the figure. In all cases, the ground-plane length was fixed at 60 mm, and the spacing was optimized to be 3 mm for obtaining best bandwidth.

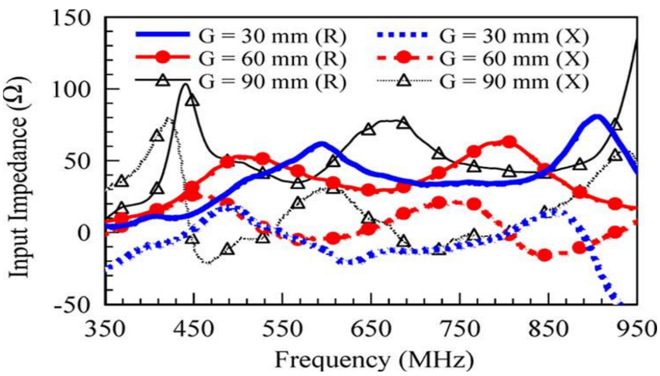

Fig. 7. Measured input impedance for the antennas.

Using a microstrip- line feeding scheme for the proposed antenna is the relationship between the ground-plane dimension and the matching performance of the operating bandwidth. For this, the ground-plane length G was varied from 30 to 90 mm.

Comparisons of different parameters:

Journal Name	Author	Technique	Antenna Size	Gain	Bandwidth	Used In
IEEE 2013	Md. Imran Hasan	Taconic TLY-5 substrate Circular ring slotting tech.	13.5*16.9*1.588 mm^3	4.84dB at 19.50GHz	2.86GHz	C-band, X-band, Ku-band, K-band for radar and satellite application
PIERS Proceedings 2013	Debdeep Sarkar	FR4-epoxy substrate 2CSRR(complementary split ring resonators) DGS	35*35mm^2	1.24,4.4dBi	3.2-3.8GHz 4.81-5.90GHz	WLAN and WiMAX
JMOEA 2013	ZAAKRI Safa	Arlon DiClad 880 substrate	7.46*6.54mm^2	6dB	12-18, 18-28	Ku-band and K band for satellite comm.
IEEE 2009	M. Gopikrishna	Semi-elliptical slot antenna FR4-epoxy substrate	29*7.3319*1.6mm^3	6dB	3.1-10.6 GHz	UWB applications
IEEE 2009	Soubhi Abou Chahine	H-plane and E-plane is simulated FR4-epoxy substrate	50*50*1.6mm^3	0.25dB at 2.4GHz	2.69-10GHz	3G, Wi-Fi, WiMAX, UWB applications.

IEEE Letters 2008	Horng-Dean Chen	Meandering strip FR4-epoxy substrate	46*25*114mm^3	1.58-2.1 dBi	470-862 MHz	DTV applications

CONCLUSION

After an extensive literature, the research has been motivated by their potential use in future applications in satellite, wireless communication and multifunction systems. It has been studied that the bandwidth enhancement, high performance, cost effective, and the antenna size is an important area of study and research.A studied from previous papers, in order to generate the frequency band notch function for different applications in single antenna a modified planar monopoles have been recently proposed. The different types of slits are used to obtain the desired notch characteristics. The main intension of this study is to provide a useful reference for future work.

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