AN EFFICIENT NOISE REDUCTION BASED U - SLOT ANTENNA FOR MILLITARY APPLICATIONS

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Abstract

Rapid growth of wide band communication system the circularly polarized patch antenna place unbeaten able place. The designed antenna has low profile of complexity for WLAN. The antenna has modified U-slot and square patch design which will give high bandwidth of the operating frequency. Dual band antenna technology for transmitting the information through large bandwidth. In this architecture, my work is to design U-slot patch and square patch antenna design. This design is to improve the resonant frequency level based on Gaussian Process Regression. The existing antenna used to the multi band operation and this design consists symmetry radiation patch, dual rectangular ground plane and it also increase the current path length and get lower resonance frequency. The proposed method is to design a u-slot patch and square patch based microstrip antenna design. This design is to improve the resonant frequency level based Gaussian Process Regression. The GPR approach is used to implement the automatic relevance determination function and to modify the feed point placement for square patch antenna. My proposed work, to join the ground plane to patch design. The cylinder type of joint connection to implement the dual beam antenna U- slot antenna. My proposed work is to analysis the reflection radiation pattern and to remove the noise radiation in our antenna patch design. Low design space and to improve the resonant frequency level in proposed design. It provides high gain.

Index Terms: *WLAN-Wireless Local area Network, HFSS-High Frequency Structural Simulator*

Introduction

Antennas are a very important component of communication systems. By definition, an antenna is a device used to transform an RF signal, traveling on a conductor, into an electromagnetic wave in free space. Antennas demonstrate a property known as reciprocity , which means that an antenna will maintain the same characteristics regardless if it is transmitting or receiving. Most antennas are resonant devices, which operate efficiently over a relatively narrow frequency band. An antenna's beam width is usually understood to mean the half-power beam width. The peak radiation intensity is found and then the points on either side of the peak which represent half the power of the peak intensity are located. The angular distance between the half power points is defined as the beam width. Half the power expressed in decibels is —3dB, so the half power beam width is sometimes referred to as the 3dB beam width. Both horizontal and vertical beam widths are usually considered.

Generally antenna radiates an elliptical polarization, which is defined by three parameters: axial ratio, tiltangle and sense of rotation. A perfect circular polarization results for the unity axial ratio with zero tilt angle. A single patch antenna can be made to radiate in circular polarization if two orthogonal patch modes are simultaneously excited with equal amplitude and 900 out of phase with sign determining the sense of rotation. Two types of excitations for circularly polarized microstrip antennas: (a) dual fed patch and (b) singly fed patch. The first type is dual fed patch, which uses an external power divider network. The other is singly fed patch for which an external power divider is not required. In this paper, we propose a novel antenna design with two notched-bands for UWB radio systems. To create the dual-band rejection, two different EBG structures which have two different stop-bands are implemented along the micro strip feed line for acting as top-band filters. As a result, the antenna achieves dual band-notched characteristics at the frequency bands of 3.375 3.875 GHz and 5.325 6.150 GHz for WLAN. Omni-directional radiation patterns and stab legain are obtained. An in-house developed computational tool based on the Finite-Difference Time Domain (FDTD) method and the MATLABR programming environments are used for simulation works. In general, an LP wave can be changed into an elliptically or circularly polarized wave by using a wave polarizer. It should therefore be possible to obtain an omni directional CP antenna by adding a wave polarizer to an omni directional LP antenna. However, adding an external polarizer will inevitably increase the size and complexity of the antenna. An interesting CP cylindrical DRA has been proposed, which has slots fabricated on its top for exciting a broadside CP radiation mode. This printed patch antenna is low profile antenna, contented to planar and non-planar surfaces, simple and inexpensive to manufacture from present day printed technology. It is also usually inexpensive to manufacture and design. For improved antenna function, a wide dielectric substrate having a low dielectric constant is advantageous this provides better capability, superior bandwidth and better radiation. Still, such a propose d design leads to a bigger antenna size. The circularly polarized antenna which can be easily implemented by properly slice a section (L) from a side of the equilateral - pentagon patch in which the fundamental resonant mode of the equilateral - pentagon antenna and it is split into two near - degenerate orthogonal modes with equal amplitudes and a 90' phase difference.

Design and configuration of antenna

1. Review

The proposed printed-type antenna is based on a 1.6 mm-thick FR4 epoxy substrate with dimensions 25mm £ 38mm. It has a rectangular split-ring slot enclosed inside a rectangular patch. The inclusion of the split-ring slot and the U-shaped slot in the partial ground plane gives resonance at two additional frequencies. The dimensions of the patch, the ground, and the two slots are optimized to obtain these desired functional frequency range. A novel triple-band antenna suitable for WLAN/WiMAX applications is proposed in this paper. Using a split-ring slot implanted in the rectangular patch and a U-shaped slot etched partial ground plane, three resonant modes with excellent impedance performance are achieved. The compact size, triple-band frequency, excellent radiation patterns, good gain and a simple structure makes this antenna suitable for practical wireless communication systems, working on WLAN and WiMAX networks, in three different frequency bands, 2.4, 2.5, 3, 4, 5.2, 5.9GHz.

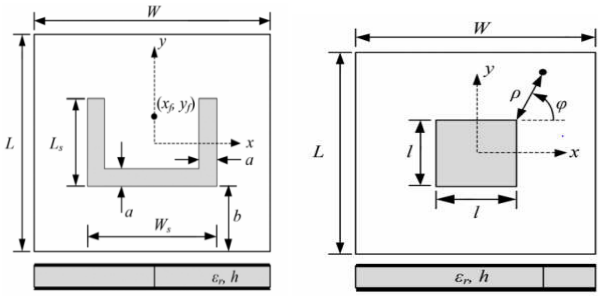


Figure 2.2.1 shows the patch and ground design of the antenna

2.1.2 Analytical Calculation

1. Calculation of wavelength (λ)

   $\lambda = \frac{c}{f_0} = \frac{3\times10^8}{2.4\times10^9}$

   λ=125mm.

2. Calculation of width (W)

   $W = \frac{c}{2f_0\sqrt{\frac{(\epsilon_{r+1)}}{2}}} = \frac{3\times10^8}{2\times24\times10^9\sqrt{\frac{(4.4+1)}{2}}}$

   W=34mm.

3. Effective dielectric constant

   $\epsilon_{eff} = \frac{\epsilon_r+1}{2} + \frac{\epsilon_r-1}{2}[1 + 12\frac{h}{w]}^{\frac{-1}{2}}$

   $\epsilon_r = \frac{4.4+1}{2} + \frac{4.4-1}{2}[1 + 12\frac{1.6}{38}]^{\frac{-1}{2}}$

   $\epsilon_{eff} = 4.08$

4. Length extension

   $\Delta L = 0.412h\frac{(\epsilon_{eff}+0.3)(\frac{w}{h}+0.264)}{(\epsilon_{eff}-0.258)(\frac{w}{h}+0.8)}$

   $\Delta L = 0.412 \times 1.6\frac{(4.08+0.3)(\frac{38}{16}+0.264)}{(4.08-0.258)(\frac{38}{16}+0.8)}$

   $\Delta L = 0.7389$ mm.

5. Effective length

   $L_{eff} = \frac{c}{2f_0\sqrt{\epsilon_{reff}}}$

   $L_{eff} = \frac{3\times10^8}{2\times24\times10^9\times\sqrt{4.08}}$

   $L_{eff} = 0.0390$mm

6. Calculation of length (L)

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

   $L = 0.0309 - 2 \times 0.7389$

   L= 26MM

Simulation results

This section describes the comparative results in simulation of proposed design in the evolution.

3.1 Return Loss (S_{11})

The following graph shows the return loss of the proposed design.

Figure 3.1.1 graph for return loss

3.2 VSWR

The figure 3.1.2 shows the VSWR of proposed design.

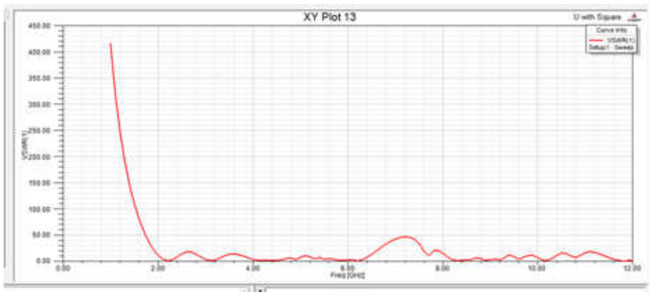


Figure 3.2.1 graph for VSWR

3.3 3-D Gain

The figure shows the 3-D gain of the antenna. The antenna produces the maximum gain of **5.7dB**

Figure 3.3.1 Simulation results of gain

3.4 Directivity

This figure shows the directivity of the antenna

Figure 3.4.1 Simulation result of directivity

3.5 Polarization

This figure shows the polarization of my proposed design

3.5.1 Monopole 1 Polarization

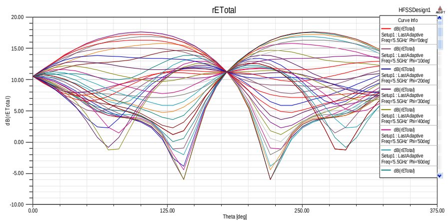


Figure 3.5.1 Simulation result of polarization

3.6 Radiation Pattern

The following figure shows the 2-D Radiation pattern of the proposed antenna. It contains the E-field and H-field.

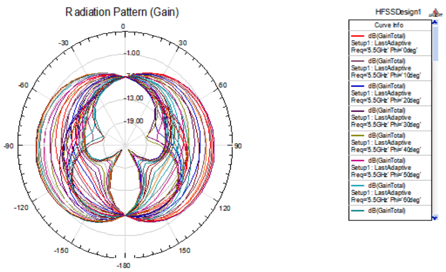
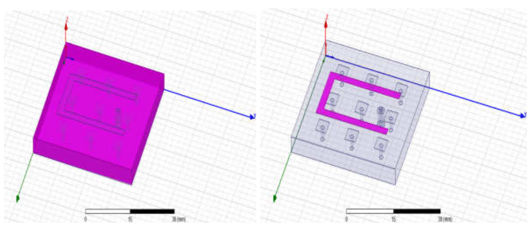


Figure 3.5.1 simulation results of radiation pattern

3.7 Current Distribution

The figure 3.7 shows the simulated results of current distribution.



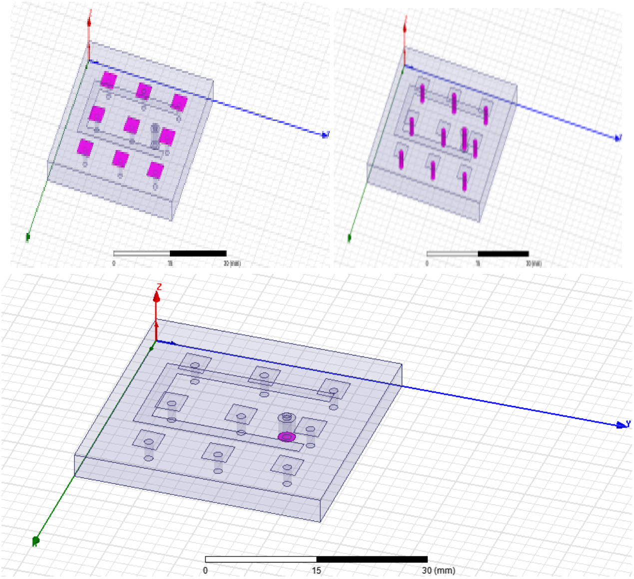


Figure 3.7.1 Current Distribution

Conclusion

A novel triple-band antenna suitable for WLAN/WiMAX applications is proposed in this paper. Using a split-ring slot implanted in the rectangular patch and a U-shaped slot etched partial ground plane, three resonant modes with excellent impedance performance are achieved. The antenna with a very compact size of 26x34mm has been designed. The triple-band frequency, excellent radiation patterns, good gain and a simple structure makes this antenna suitable for practical wireless communication systems, working on WLAN and WiMAX networks, in three different frequency bands, 2.4,2.5, 3.4, 5.2,5.9,6.4GHz.In my future work I will designed a antenna with a very compact size and give high gain compared to this antenna.

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