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CIRCULAR MICROSTRIP PATCH ANTENNA: A COMPREHENSIVE REVIEW

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Abstract

Over the past one decade, there is a rapid growth in development of various applications involving wireless communication. The performance of all such wireless systems depends on the design and proper functioning of the antenna. Microstrip antenna are preferred for majority of their applications This is because of the inherent advantages such as size miniaturization, power consumption, simplicity, compatibility with printed circuit technology, low profile, light weight, lower return loss, good radiation properties, small size, planar structure and ease of fabrication. C band are used in satellite communication, WiMAX, WLAN, Wi-Fi applications. This paper provides a comprehensive review of the research work done in the recent past by various authors on the design and optimization of the circular microstrip patch antenna with different slots operating in C band.

Keywords: *Microstrip Patch Antenna, Patch Antenna.*

I. INTRODUCTION

The antenna acts a transducer by converting electric currents to EM waves in transmission, by converting EM waves to electric currents in case of reception of signal. Antennas play a vital role in the field of wireless communications. Some of the antenna types are parabolic reflector, patch antenna, slot antenna and folded dipole antenna etc. Each type of antenna is good in its properties and usage[1]. There are hundreds of different types of antennas in use today. A very thin metallic strip mounted on a ground plane with a di-electric material in between is the micro strip antenna. The radiating portion and the feed lines are put on the di-electric material via the photo-etching process. For ease of inspection and fabrication, the patch or micro-strip is typically selected to be square, circular or rectangular in form. A micro-strip or patch antenna is shown in the following image[2].

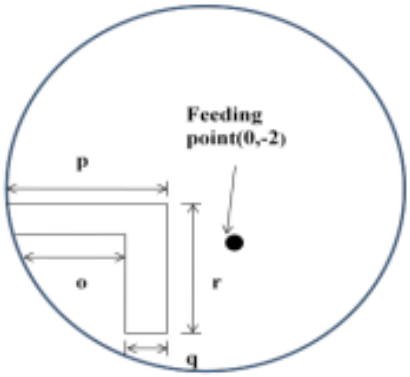

Fig. 1 Illustrates the Antenna with L-slit.

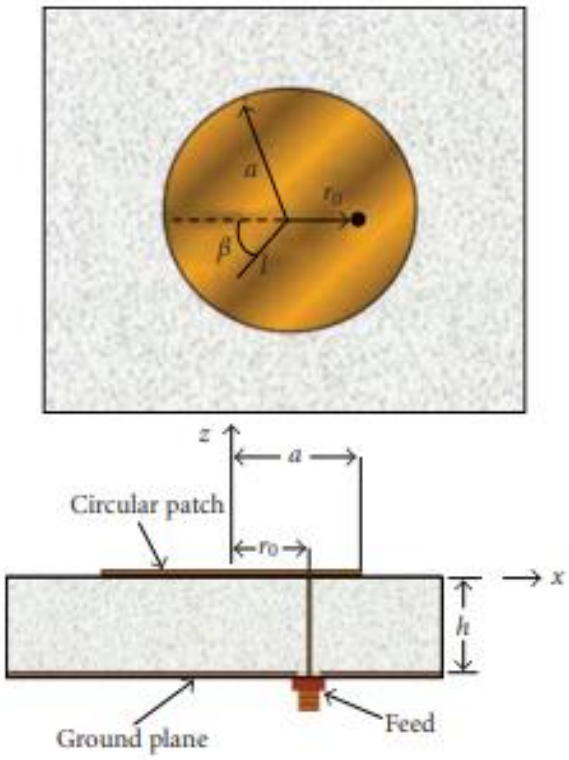

Fig. 2 Illustrates Geometry of circular microstrip patch antenna..

Radar devices, such as tracking and remote sensing, have been used for numerous applications. Techniques of radar remote sensing have become important to researchers. Centered on the propagation of short duration pulses, the Ultra Wideband radar system. The idea of this radar is to transmit pulses for a short time and then detect the pulse response that is reflected[3]. Figure 1 illustrates the Antenna with L-slit. Figure 2 illustrates Geometry of circular microstrip patch antenna. The width W of the antenna can be determined by utilizing the following equation.

$$w = \frac{c}{2\, f_r \sqrt{\frac{(\varepsilon_r + 1)}{2}}}$$

Where

f_r denotes the resonant frequency, and

r represents substrate dielectric constant

The effective dielectric constant (ε_{reff}) of DRA antenna is derived by using the following equations[4].

$$\varepsilon_{reff} = \frac{(\varepsilon_r + 1)}{2} + \frac{(\varepsilon_r - 1)}{2} \sqrt{\left(1 + 12\frac{h}{W}\right)}$$

Where h denotes the height of the antenna and W denotes the width.

The length of the antenna may be measured by applying the following equation.

$$L = \frac{c}{2\, f_r \sqrt{\varepsilon_{reff}}}$$

The antenna length extension is calculated by applying the equation below.

$$\Delta L = 0.412\, h\, \frac{\left(\varepsilon_{reff} + 0.3\right)\left(\frac{W}{h} + 0.246\right)}{\left(\varepsilon_{reff} - 0.258\right)\left(\frac{W}{h} + 0.8\right)}$$

II. LITERATURE REVIEW

A brief overview of past work in the antenna sector is given in this section. It shows the theoretical and experimental work of various types of microstrip antennas around the world. This chapter briefly discusses different advances in the design of circularly polarised microstrip antennas and also addresses recent trends in the design of dual band microstrip patch antennas in modern communication systems. It selects and examines papers related to microstrip patch antennas.

Nasimuddin et al. have proposed a double-band circularly polarised S-shaped slotted patch antenna with a limited frequency ratio. The S-shaped slot in this letter digs at the middle of a square patch radiator for dual-band operation. Underneath the centre of the coupling aperture ground-plane is a single microstrip feed-line. By changing the S-shaped slot arm lengths, the frequency-ratio of the antenna can be adjusted. 16 percent (1,103-1,297 GHz) and 12.5 percent (1,444-1,636 GHz) respectively are the measured 10-dB return loss bandwidths for the lower and upper bands[5].

III.DISCUSSION AND CONCLUSION

Microstrip patch antennas are popular, because they have some advantages due to their conformal and simple planar structure. They allow all the advantages of printed-circuit technology. A vast number of papers are available in the literature, investigating various aspects of microstrip antennas. Development of microstrip antennas was initiated in 1981, where a space-borne, light-weight, and low-profile planar array was needed for a satellite communication system.

The microstrip patch antennas are most preferable antennas due to its inherent advantages like small size and weight, low cost, printed directly on the circuit board, low profile and easy to fabrication. The slotted antennas are used in C Band applications like satellite communication, WLAN, WiMAX, Wi-Fi etc. This paper describes about the introduction of different slots on the antenna have resulted in improvement of various performance parameters of the antenna like gain, bandwidth, return loss etc.

IV. REFERENCES

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