

SURVEY ON U-SHAPED PRINTED ANTENNA

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Abstract : In this survey paper discuss the concept of u-shaped patch antenna designed in the slot antenna in last decade. In present situation there will be an improvement in compact size of the antenna, resonance frequency, efficiency, Bandwidth, gain, VSWR, radiation pattern, return loss by using different enhancement techniques for wireless communication. In this survey compared the u-shaped slot antenna for different Applications in terms of type of co-axial feed, gain, bandwidth, VSWR.

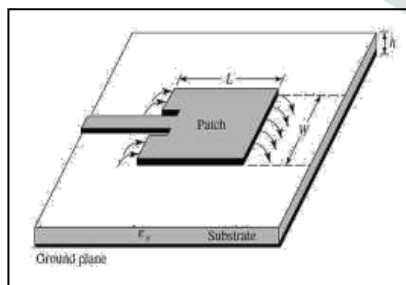
IndexTerms: U-shaped patch, MSA, VSWR, Gain, Bandwidth -

I. INTRODUCTION

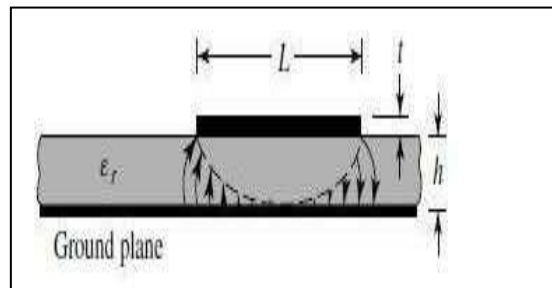
An antenna is an electronic device it acts as a transducer i.e., electrical signal into radio frequency signal and radio frequency signal into electrical signal vice-versa at the sending end and receiving end. Antenna consists of an electronic circuits which feed the electrical signal to an transmitting antenna which radiates electromagnetic waves into the spaces at the transmitting end while at the receiving end antenna receives an electromagnetic signals and converted back to electrical signals. The entity of this paper is to ameliorate the performance like gain, bandwidth, impedance, directivity, VSWR, efficiency, return loss etc., MSA (micro strip antenna) are highly preferred in now days because of these advantages such as compact size, less weight, cost efficient for wireless communications and satellite communications. MSA has low profile because of its size and design it is most widely used in mobile communications, radars, satellites, microwave bands.

II. MICROSTRIP ANTENNA

Patch Antenna is applicable for transference and acceptance of EM waves. Patch antennas are having huge number of advantages compared to other Antennas such as light weight, low cost, low profile it is incline towards different Applications such as mobile communications, satellite communications, military ,radar, microwave bands etc., but these antennas suffers from narrow bandwidth, low gain ,impedance mismatch these things can be overcome by enhancing the design methodology. During the design process of printed antenna the following steps taken care of those are substrate, patch, ground plane and type of feed. Microstrip Antenna has three different layers which are patch, substrate and ground plane. basically a radiating patch is used which is good conductor and ground plane in between these a substrate or die-electric is placed. On the radiating patch the slot is designed which is in U-shape to get good bandwidth, gain, and VSWR. Microstrip antenna suffers from narrow bandwidth this set back has over come by using different technics such as (i) direct resonant antenna, (ii) coplanar waveguide technic and (iii) fractal geometry. (i) In direct resonant antenna designing of microstrip can selected in geometry of slot. the focus od direct resonant antenna is to offer broad band operation depending upon excitation process, shape and different dielectric materials which are used. (ii) coplanar waveguide technique is another technique is used for microstrip feed line for the microstrip antenna. (iii) fractal geometry is appeal on patch antenna which allows there will be change in current direction hence resonant frequency changes which operates on different bands such as L, S, X, C then these bands are applicable for different applications like GPS etc., by increasing the number of slots the quality factor will be reduced and bandwidth will be increased



Different types of dielectric materials are available for substrate (FR4) whose conductivity range lies in between 2.2 to 12 and height of the substrate will be ranges from 0.003 λ to 0.5 λ . Based on height of the substrate bandwidth can be increased.



Four different types of feeding techniques are available for microstrip antenna they are MSFL, CLF, ACF, PCF. In MSFL (microstrip feed line) by using this method surface waves and thickness of the substrate increases but the feed line is connected across the end of PA. In CLF (coaxial line feed) the feed point can be placed at any desired position on the patch but if the length of the feed increased then it will cause an impedance mismatch. In ACF (Aperture coupled feeding) it will increase the bandwidth only when the size of the substrate increased.

III. SOFTWARES USED FOR SIMULATION

(i) FDTD acronym is finite difference time domain method is used for simulating the microstrip antenna for coplanar waveguide techniques has been used for wire less communications. (ii) HFSS acronym is High frequency structural simulator is used for analyzing the bandwidth, VSWR, radiation pattern etc., (iii) IE3D is high optimized software for designing the antenna for simulation and number of array cells can be placed in order to obtain the desired results. (iv) FEKO electromagnetic software for wired antenna simulation which uses MoM and FDTD techniques etc., (v) ADS advance design system is tool for designing antenna for RF signals and it provides desired radiation pattern.

IV. LITERATURE SURVEY

1. panchatapa bhattacharjee et.al(2013) "design of U-Shaped patch antenna for wire less LAN at 2.45GHz"

Summary-this paper designed an antenna with a electromagnetic software using FEKO in order to achieve a desired bandwidth in the order of 374.73MHz with a gain of 7.13decibels and impedance matching is around 50 ohms. it also provides a detailed comparison in bandwidth, gain, VSWR, reflection coefficient using tabular method. this antenna feed by quarter transformer feeding technique which uses defected ground plane structure in order to get more gain than microwave conventional antenna.

2. keshav mishra et.al(2014)"Analysis of double U-shaped slot loaded patch antenna for Uwb applications"

Summary-in this paper antenna is designed by using ANSOFT High frequency structural simulator mean while to get optimized impedance matching with effect of small variations in substrate material, length and width of the U-shaped slot in order to achieve a bandwidth in the order of 10GHz with VSWR < 2. these specifications are widely suitable for Ultra wide-band applications. In this paper 4 different types of substrates and different length of ground planes are been used such as in order to provide impedance matching, the return loss is also minimum because of perfect conductor ground plane is used and shows good E-plane and H-plane radiations.

3. chandan kumar Dubey et.al(2015)"Broad band Rhombus shaped Micro strip patch Antenna with U shaped slot for Wimax Applications"

Summary-in this paper design of an antenna can be implemented by using IE3D software to get and proper impedance matching of around 50 ohms and desired bandwidth instead of using rectangular patch the rhombus shaped patch is used for efficient design. this antenna uses different resonant frequencies ie., 5.20GHz and 5.58GHz in order to achieve a desired bandwidth of 22.32% and directivity is around 6-7 decibels suitable for Wimax Applications.

4. Hrucha R.Kharat et.al(2016)"Design and Analysis of compact U slot Microstrip patch Antenna for Wireless Applications"

Summary-in this paper the compact size of U slot antenna is used in printed antenna designed using HFSS software to get symmetrical radiation pattern very good bandwidth, higher gain with reduction of resonant frequency from 44GHz to 10GHz with VSWR < 2 the proposed antenna size is reduced upto 15% which is used for Wireless LAN Applications. there is no is required between layers. the etching process is employed to get desired bandwidth. the return loss is around -19db. the directivity is also increased to around 5db and the dimensions of u-slot also less.

5. S.Kannadhasan et.al(2017)"Design and Analysis of U-shaped Micro strip Patch Antenna"

Summary-in this paper the proposed antenna design of U-Shaped antenna by using ADS software with bandwidth operating at 3.8GHz and a desired gain of 7.74dB is achieved for military, wireless and civil applications with a high efficiency of 99.6%. triple band and dual band frequencies of operation can be possible for different applications. compare to all other designs such as E shaped, H shaped, L shaped, T shaped, Z shaped and I shaped are using out of all these shapes U shaped PA are preferred for WIFI and WLAN applications. in most of designs the substrate which is used is FR4 but here using Alumina as die electric substrate.

6.Neenansha jain et.al(2017)“Survey on Different shape Microstrip Antenna with Different slots”

Summary-in this paper the design of antenna can implemented by using frequency in the range of 1 to 10GHz.different slots have been provided on patch for improvements in all the parameters.this is widely used in 4G,5G applications.in present it is mostly used in different frequency bands such as C,K,Ku,Ka used in satellite applications.a small circuit or device can be worked for many frequencies and type of feed is also convenient to antenna in this way size and weight of the antenna is reduced.

7.Sofiya N et.al(2018)“Multiband Microstrip Patch Antenna with DGS for X-Band,ku-Band and K-Band Applications”

Summary-in this paper the antenna is designed with defected ground surface order to get desire bandwidth with different operating frequency suitable for different frequency bands.here defected surface ground is adjusted in a proper manner to accommodate a circular slot in middle to provide different resonant frequencies for various bands such as X,Ku,K bands.x band is used for military applications , Ku band is used for satellite applications and k band is used for vehicle monitoring etc.,it improves its performance by HFSS based on finite element method.this method is particularly suitable for radar Applications.here instead of using normal ground plane using defected ground surface to enhance the characteristics of microwave devices.

8.Nikitha M.Tarpara et.al(2018)“Design of slotted microstrip patch antenna for 5G Applications”

Summary –this paper provides a detailed explanation about 5G applications where the microstrip antenna is used for getting designed bandwidth and gain but major drawback in this antenna it suffers from narrow impedance.by inserting the slot resonant frequency can be reduced more over bandwidth of an antenna can be increased.resonant frequency can be changed by placing a slot and replacing the slot.in this the antenna is designed by using hfss is used to enhance the design and radiation pattern.

V.ACKNOWLEDGEMENT

In this survey paper compared different applications of U-Shaped microstrip Antenna for different Applications like wireless LAN,WiMAX,4G,5G and different bands such as C,X,Ku,K band etc.,the drawback of narrow gain bandwidth can improved by increasing height of the dielectric and using more number of slots in patch.this analysis can be implemented by using IE3D software.

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