

Optimum Return Loss of Right-Angle Triangular Slot Antenna

K. Tangkaphiphop, N. Anantrasirichai
ReCCIT, Faculty of Engineering
King Mongkut's Institute of Technology Ladkrabang (KMITL)
Ladkrabang, Bangkok, 10520, Thailand
E-mail : kanoppin@kmitl.ac.th

T. Wakabayashi
School of Information Technology and Electronics, Tokai University
Hiratsuka, Kanagawa, 259-1292, Japan
E-mail : wakaba@et_u-tokai.ac.jp

ABSTRACT

When the antenna is used for transmitting or receiving signals, there will normally significant on characteristics of antenna for matched impedance at resonance frequency. To analyzed and designed antenna for good performance will be considered. In this case, we will investigate microstrip antenna.

There are many type of antenna can be used for transmit and receive signals. Microstrip or printed antenna is one type of antenna which is small size and light weight and widely used in wireless and mobile communications. The microstrip antenna can be classified into 2 type, patch and slot antenna. Each type of microstrip antenna have many shape and configuration such as square, circular, elliptical, rectangular, triangular, ring, thin strip (dipole), etc., and the feeding will be depend on its configuration.

In this paper we will proposed and analyzed on right-angle triangular slot antenna fed by microstrip line. This antenna consists of dual triangular slot antenna on the ground plane of the microstrip line. The characteristics of printed antenna such as input impedance, S parameter and far field patterns of radiation are obtained by using the finite difference time domain (FDTD) method. The problem space in the FDTD analysis is $x \times x \times x$ cells with the cell dimension $x=0.152\text{mm}$, $y=0.15\text{mm}$. Time step is set at the courant condition.

On the other hand, the Finite Difference Time Domain (FDTD) method is introduced to solve the complicated problems in electromagnetic field theory. The FDTD method is capable of computing electromagnetic interactions for geometric problems that it is extremely difficult to analyze by other methods. This technique is well-suited for handling complicate microstrip antenna configurations because it can countered in these structure. Therefore, FDTD method is also use as a tool to obtain antennas characteristics various aspect.

In the antenna design, it is important to focus on a signal returning from load. To avoid this unwanted effect, it is important to reduce the reflected signal as much as possible by process of matching. Furthermore, it is affected by a feeder, a substrate and a frame. Therefore, it is practice to analyze antennas with them. This antenna is simple and easy to design and fabricate in practice. We will analyze an input impedance on matching process at desirable resonance frequency 10 GHz by using simulation program. From basic arrangement of dual right-angle triangular slot antenna on the ground plane, the match impedance with characteristics impedance of transmission line 50 ohms by adjust stub length of microstrip line (return loss : $S_{11} = -32\text{ dB}$). Then, insert the other slot in the case of parasitic slot near right angle side of slot antenna, its will be effect on return loss ($S_{11} = -78\text{ dB}$). In this case, the good matching impedance will be shown in figure, it causes the change in values of the real and imaginary parts of the input impedance. Finally, the real part impedance is nearly characteristic impedance of transmission line and imaginary part about zero ohms. The simulation results for practice are carried out as show in the table.

CONCLUSION

Optimum return loss of right-angle triangular slot antenna by insert parasitic slots in the ground plane near right angle side of the slot antenna. The simulation results S_{11} will be -78 dB , it show that matching impedance better than triangular slot antenna without parasitic slot.