

BROADBAND CIRCULAR MICROSTRIP PATCH ANTENNA FOR WIMAX MARINE APPLICATION

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Abstract – The evolution of wireless communication systems have intended to exploit the research advance in telecommunications areas in order to get its performances. Actually, the microstrip patch antennas have more importance in radio communication applications due to its low cost and weight, ease of fabrication and installation. Particularly, in the sea environments, the motions of boys which are used as means for transmitting and receiving information can affect its communication services. To maintain this scenario of communication, an omnidirectional antenna is required. To meet the overall requirements, we have presented a slotted circular microstrip patch antenna. This antenna is fed by CPW structure to increase the frequency band. The antenna has a circular slot cut in the ground plane and circular patch is printed within that. Moreover, the WiMAX band 5.8 GHz is implemented in this application. The structure is designed on FR4 substrate by applying CST Microwave Studio simulation software.

Keywords – Wireless communication systems, Microstrip patch antennas, CPW structure, WiMAX.

INTRODUCTION

The wireless communications have evolved at surprising rate during the last decade, thus the transceiving antennas with simple structure are pressing in demand. Moreover, the future wireless communication systems require wideband antennas to ensure the transmission of high data rate and great information. In addition, the antenna design which meets the requirements of a simple structure and wide bandwidth for use in the modern wireless communication system becomes a challenge for the researchers.

Nowadays, microstrip patch antennas have been widely used in wireless communication systems due to its low profile, low cost, ease of integration and fabrication. However, this kind of antennas goes through some difficulties such as a low gain and bandwidth, directional radiation pattern. The recent researches in this line are added various techniques so that the microstrip antennas achieve its performance to be useful for manifold wireless communication applications. In the literature, many coplanar waveguide (CPW) fed and microstrip fed wide slot antennas have been proposed for wideband applications. The sea environment is one of the mediums in which the radio communication could use wide-

band antennas. Furthermore, the propagation of radio waves in this medium can be affected due to natural phenomena. The system boys used as means for transmitting and receiving information are equipped with radiant system or antenna which is considered as one of critic parts in the wireless communication systems. Moreover, the random motions of buoy necessities the specific properties of the antenna that can be used. In this sense, the small antennas size is required. To meet these specifications, the microstrip patch antenna is proposed. However, this kind of antennas has some limitations in which concern the radiation characteristics and impedance bandwidth. With the growth research on this subject, various techniques can be of interest to enhance the performance of such antennas. Otherwise, recent wireless technologies used in marine applications are mainly based on VHF, cellular communication systems and satellite communication systems. Whereas, these technologies in some cases suffer from lot of weakness like low system capacity, a short bandwidth, short range and limitation of frequency spectrum. These problems have taken into account new emergent technologies to fulfill these limitations. Therefore, the wireless system based on WiMAX standard could be a good solution for current wireless systems. This WiMAX can reach a theoretical up to 30 miles radius coverage. Moreover, the data rate concerned for the WiMAX band is 70 Mbps. These potentials characteristics tend to be adequate for our application case. Recent researches are focusing in the design of reconfigurable microstrip patch antennas for WiMAX technologies. This study is also based in designing microstrip patch antenna for working at the unlicensed WiMAX band 5.8 GHz in a marine environment. The structure includes a slotted circular patch antenna and is excited through the CPW fed technique. The design is printed on the substrate of the dielectric material FR4 having a dielectric permittivity and thickness. The simulation of the antenna is based on CST microwave Studio software. The simulation results are shown a good adaptation at the resonance frequency 5.8 GHz and good radiation characteristics of the antenna. The fabrication of the antenna will be made through the machine LPKF protoMAT S100, and the measurement results will be realized in next days by using HP 8722ES vector network analyzer and time-domain measurement system (Geozondas, Lithuania) to verify the simulation results obtained. The figure below shows the structure of the designed antenna.

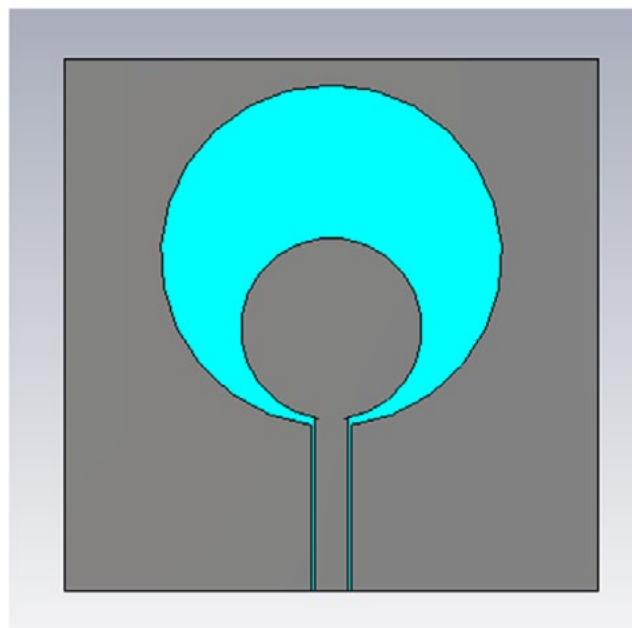


Fig.1. The structure of the designed antenna