DESIGN OF A VIVALDI ANTENNA WITH ELECTROMAGNETIC BAND GAP (EBG) STRUCTURE

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ABSTRACT

This paper summarizes a detailed design of a Vivaldi Antenna with Electromagnetic Band Gap (EBG) structure. The Antenna is proposed at a height of 0.51 mm from the substrate Rogers RT/Duroid®5870 with nine squares of EBG structure. The EBG structure is placed at ground plane with copper cladding of 0.0175 mm. The patch antenna structure was designed to resonate at frequency of 5.6 GHz. This work is focused on designing the best Vivaldi antenna by collecting the best simulation result in terms of return loss (S_{11}), bandwidth (BW), radiation pattern of gain and directivity and voltage standing wave ratio (VSWR). The work is proceeded by combining Vivaldi antenna with EBG structure. This combination is to investigate the EBG structure characteristic in antenna design in order to increase the performance of antenna in term of return loss and bandwidth. Simulations and measurements have been carried out to verify the performance of Vivaldi antenna with and without EBG structure. All the simulation and measurement work is done by Computer Simulation Technology (CST) Studio Suite software and Vector Network Analyzer (VNA) respectively. The simulated and measured results are presented.

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CHAPTER 1

INTRODUCTION

This chapter begins with the elaboration of background of the antenna which is including the revolution of the antenna communication system accretion. The section is proceed with the explanations of Tapered slot antenna (TSA) history and the beginning of the Vivaldi antenna. All of the information will be describe later in this paper.

1.1 HISTORY OF ANTENNA

Early in the 1890s, there were not much antennas in the world. These basic devices were primary used as a part of experiments that demonstrated the transmission of electromagnetic waves. By World War II, antennas had become so comprehensive that their use had changed the lives of the average person via radio and television reception. It representing growth rivaling the auto industry during the same period by the number of antennas in the United States was on the order of one per household.

By the early 21st century, mobile phones play a significant role evolution that average person now carries one or more antennas on them wherever they go. This significant rate of growth is not likely to ease, as wireless communication systems become a larger part of everyday life. In addition, the strong growth in Radio frequency identification (RFID) devices suggests that the number of antennas in use may growth to one antenna per object in the world as a product.