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Chapter 23
Design of a Compact MIMO Antenna for RADAR Applications Using DGS Technology

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1 Introduction

MIMO technology has now become a key feature for different antenna systems as it leads to high data rates and high bandwidth which is the need of future communication technology [1, 2]. The condition to design a MIMO system is that the multiple antennas should work independently of each other with a very low mutual coupling between as this will cause interference between antennas [3]. UWB is used for short-range indoor wireless communications but it supports a high bandwidth and a high data rate. There are many applications running under the UWB [2, 4–6]. In this paper, first we have designed a simple microstrip patch antenna with full ground plane, after that the bandwidth of antenna was increased by using a defected ground structure. The dimensions of the defected ground structure were analyzed and the best dimensions were selected to give a UWB frequency range. The antenna was showing a minimum attenuation at a frequency of 9.4 GHz that can be used for RADAR applications in the UWB. Furthermore, a 2 antenna MIMO system was designed by rotating one antenna at an angle of 90° with respect to other to reduce the mutual coupling between the antennas. The separation distance of the antennas was adjusted to get a low mutual coupling keeping in mind the compactness of antenna. Thus, we designed a two antenna system that was analyzed for correlation coefficient, diversity gain and also the antennas were working independently of each other on UWB.

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