M. S. THESIS DEFENSE

Performance of Microstrip Patch Antennas and Arrays on Electromagnetic Bandgap (EBG) Structures

By

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The rapid growth of wireless and satellite communication applications has provided an impetus for increased interest in the research and design of antennas with enhanced performance characteristics. Periodic structure has long been an active subject in the microwave community and has recently attracted considerable attention due to the incorporation of electromagnetic bandgap (EBG) structures for enhancing antenna performance. In the proposed work, first of all an EBG structure has been designed on a dielectric substrate material. Then it has been employed to study microstrip patch antennas and arrays performance etched on another substrate layer. Thus, basic idea is to design the EBG substrate backed patch antenna, so that the bandgap of EBG substrate and resonant frequency of patch antenna overlaps, therefore inhibiting the surface wave propagation. The feature of surface wave suppression helps to improve antenna's performance such as increasing the antenna gain and reducing back radiation in the case of finite antenna ground plane. However in this work, mostly infinite ground plane has been used, therefore improvement in backlobe radiation is not considered. In addition, the in-phase reflection feature leads to low profile antenna designs. A single patch has been investigated with the designed EBG by varying number of EBG layers and their spacing with the patch. Based on this study, the finite size linear and planar array antennas for fixed beam position have been investigated. Further, study has been performed to implement this in a phased array antenna for both impedance and radiation patterns characteristics, including beam steering.

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