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Title: Dual Band Microstrip Arrays and Ultra Wide Band Antennas with Electromagnetic Band Gap Structures

This research focuses on the possibilities of integrating Electromagnetic Band Gap (EBG) structures with Dual Band Microstrip Antenna's Array (DbMSAA) and Ultra Wide Band (UWB) antenna, with an objective to further improve the antennas' performance by reducing, if not eliminating, the limitation that they have. From the parametric study of the already established two-dimensional mushroom shaped EBG structures, novel designs of dual band-gaps EBG structures are proposed and fractal shapes were implemented to achieve the objective. As a result, guidelines, graphs and tables of the EBG structures' designs and configurations were put forward for reference.

DbMSAA has been purposely designed to represent a problematic antenna and, through the incorporation of EBG structures via novel and innovative techniques, the performance of the antenna has been improved, upgraded and realized. Grating lobes diminished, radiation patterns become more symmetrical and its gain increased. UWB systems could become a jammer for the numerous licensed services if it does not comply with the regulations mandated by the Federal Communication Commission. To solve this problem, a single unit of EBG lattice is incorporated into a model of the UWB antenna to act as a 'band stop filter' in such a way that the radiating power is reduced to a level that will not intrude any existing channels.

Finally, other filtering techniques, which seem to be much simpler such as stubs and defected ground plane (DGS) techniques were also investigated and compared to the EBG structures. Stubs could filter out and stop the targeted band of frequencies but undesirably, it upset the input impedance of the antennas, while the DGS technique is only suitable for thin substrate of less than 0.5 mm. These circumstances confirmed that the EBG structures performed better, and validate the works and concept proposed.