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## **DESIGN OF A CAVITY BACKED WIDE BAND BOW-TIE ANTENNA FOR GROUND PENETRATING RADAR APPLICATIONS**

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The ground penetrating radar (GPR) designs demand antennas with higher bandwidth centered at lower frequencies, thus the conventional antenna designs such as dipoles cannot be used effectively. This study, discusses the designing of a specialized ultra-wide band bow-tie antenna to be used in ground penetrating radar applications meeting the above mentioned specifications.

According to the prior literature review, it is evident that most of the bow-tie antenna designs have been carried out by mixing micro strip principles with empirical methodology. Our objective was to develop an antenna which acts in the range of 250 MHz to 700 MHz whilst restricting the antenna lobes to the direction of the ground. In order to specifically fulfill the latter requirement, a cavity backed design had to be considered.

The antenna was modelled using *Ansoft HFSS* software package which is widely used in the current industrial domain. The simulations were carried out for different antenna configurations by changing its parameters according to linear programming techniques. Further, electromagnetic interferences (EMI) have been eliminated by successfully integrating a metal cavity which acts as a reflector to the antenna. Parameters related to the cavity were tweaked in order to obtain the optimum frequency response. The most satisfactory antenna configuration was obtained referring to the simulation results.

According to the obtained frequency response, it is concluded that the antenna can be used for GPR applications in diverse geological conditions such as soil types and moisture contents. Moreover, due to its low frequency response it has the ability of penetrating deeper into the ground.