

Ultra-Wideband Antenna Development to Enhance Gain for Surface Penetrating Radar

Abstract

The aim of this article is to introduce a compact configuration of an arc shape ultra-wideband (UWB) planar antenna with nominal characteristics towards surface penetrating radar (SPR). The design is implemented to enhance antenna gain and bandwidth widening, that makes it a suitable device to be used in the detection or scanning operations. To serve the purpose, a simplified defected ground structure (DGS) method is been adopted, in which different rectangular size slots were induced over the surface of the ground plane to condense the surface current distribution of the radiating patch. Furthermore, the measurements elaborated that the proposed DGS based antenna has a very wide bandwidth from 3 to 16 GHz, which is significantly greater than the defined UWB range. The resultant gain is 6.2 dB that helps in deep penetration and the wider bandwidth can carry more information, which makes the antenna a potential device to be used in detection applications. The detection capacity of antenna has been validated using monostatic and bistatic based experimental configurations. Apart from this, a simple structure and low cost fabrication of antenna makes it appropriate for SPR applications.

Keywords

Antenna; Detection; DGS; Gain; Ground penetrating radar; Ultra-wideband; Wideband