

Investigation of Utilizing L-Band Horn Antenna in Landmine Detection

Authors : Ahmad H. Abdelgwad, Ahmed A. Nashat

Abstract : Landmine detection is an important and yet challenging problem remains to be solved. Ground Penetrating Radar (GPR) is a powerful and rapidly maturing technology for subsurface threat identification. The detection methodology of GPR depends mainly on the contrast of the dielectric properties of the searched target and its surrounding soil. This contrast produces a partial reflection of the electromagnetic pulses that are being transmitted into the soil and then being collected by the GPR. One of the most critical hardware components for the performance of GPR is the antenna system. The current paper explores the design and simulation of a pyramidal horn antenna operating at L-band frequencies (1- 2 GHz) to detect a landmine. A prototype model of the GPR system setup is developed to simulate full wave analysis of the electromagnetic fields in different soil types. The contrast in the dielectric permittivity of the landmine and the sandy soil is the most important parameter to be considered for detecting the presence of landmine. L-band horn antenna is proved to be well-versed in the investigation of landmine detection.

Keywords : full wave analysis, ground penetrating radar, horn antenna design, landmine detection

Conference Title : ICMST 2017 : International Conference on Microwave Science and Technology

Conference Location : London, United Kingdom

Conference Dates : July 24-25, 2017