

ABSTRACT

GPR (Ground Penetrating Radar) is a useful device for the detection of objects buried under the soil surface up to a certain depth. In most systems of the ground penetrating radar (GPR), the antenna plays a very important role. Therefore, patch dipole antenna is designed for GPR applications. Printed dipole antenna problem is it only produces a narrow frequency band width. Whereas in the GPR system, antenna with wide bandwidth is required to be able to detect various permittivity. Wide bandwidth also hinted that the generated late time ringing is successfully suppressed.

With these considerations, the final task of this research the authors tried to improve the characteristics of dipole antenna by loading variations. Furthermore, we would see how the resistive and capacitive loading variation affect. For the purposes of the electromagnetic analysis in time domain, the FDTD method (finite-difference time-domain) is used. FDTD3D software is needed to calculate the transmitted wave antenna in the time domain. Then, the antenna is realized and measured.

From the analysis results of measurements done on a dipole antenna with three capacitive load, acquired late-time ringing -22.92 dB at an observation point 50 cm and an increasing of the main pulse amplitude about 10.71% compared to a capacitive load. VSWR obtained was 1.284, 46.71 Ohm antenna impedance, and the resulting 1062 MHz bandwidth, equivalent to 112.5% fractional bandwidth in ultra-wideband criteria. These results suited the needs of GPR applications and acquired characteristics similar to the simulations performed.

Keywords: Dipole antennas, resistive loading and Capacitance, FDTD, FDTD3D.