ABSTRACT

GPR (Ground Penetrating Radar) is a useful device for object detecting process buried under soil level up to a certain depth and therefore soil excavation is not necessary. In the Final Task, the author simulates a spiral-dipole antenna and resistive loading to apply GPR impulse. The resistive loading is designed to compress late-time ringing and amplifying bandwidth, even though efficiency of main pulse amplitude will be decreased. Late-time ringing is oscillation coming after transmission of pulse. An oscillation is able to blur signal which is reflected by an object, thereby making detecting process difficult.

Desirable parameter of GPR antenna is ultrawideband (UWB) and ringing level is less than 10% for middle resolution. The use of resistive loading is keeping abreast a Wu-King profile. Antenna spiral system is produced based on characteristics of Archimedes Spiral. Change of constant value *k* of Archimedes spiral formula will make the shape of spiral in different densities. In the final task, the use of constant value *k* is 0.5;1;1.5. Parameters that studied in a simulation are either main pulse peak to peak amplitude or ringing resulting from each antenna in constant value *k*.

For analysis of electromagnetic in time-domain, the FDTD (finite-difference time-domain) method and FDTD3D software is used to calculate transmission of antenna wave in time-domain. Furthermore, the realization and measurement of antenna is made. The parameters that analyzed at the measurement are bandwidth, return loss, and input impedance.

Based on the analyses of simulation and measurement, a significant point in design of spiral type was obtained in spiral-dipole antenna; that is, ringing level of spiral-dipole antenna in spiral type at increasingly distant space is smaller than spiral-dipole antenna in dense spiral type.

Keywords: *GPR antenna, GPR impulse, pulse, ultrawideband, spiral-dipole antenna, resisitive loading, FDTD, FDTD3D.*