

## ABSTRACT

Ground Penetrating Radar (GPR) is a geophysical method that can be applied to detect the location, depth, and shape of the buried object such as landmine, electrical communication and water supplies. GPR utilizes electromagnetic wave to detect underground objects, accordingly it has non-destructive properties (not damaging soil structure). One of the important things from GPR is that accuracy from the object detected can be produced. The accuracy obtained can affect the specification of one part of GPR block system, antenna.

The antenna must have a wide bandwidth (ultrawide-band) with the value of fractional bandwidth more than 20% to obtain good accuracy as desired. Antenna with minimum value of late time ringing level less than -30 dB also is needed to minimize the masking effects that are not disturb the main reflection signal which has impact to the accuracy of the detection results on the GPR. This Undergraduate thesis describes the design and realization of a bowtie antenna, a block system in GPR, with the addition of self-complementary structure and resistive loading method to widen the bandwidth and minimize the value of late time ringing.

Designing of a bowtie antenna that works and reviewed in the frequency range 1300-2200 MHz is simulated using a software to investigate and obtain an antenna design that meets the proposed specifications and is followed by the realization of the bowtie antenna structure. The antenna is realized with the FR-4 substrate with dielectric constant 4.3 and thickness of 1.6 mm. The antenna simulation results show that the antenna has a bandwidth of 1105.1 MHz where cover from range from 1279.1 - 2384.2 MHz, VSWR values obtained 1.924 at a frequency of 1300 MHz. The width of the late time ringing duration obtained was 1.967 ns with the range of ringing level value of -131.6 to -30.01 dB. In the realization of the antenna measurements were obtained bandwidth of 1200 MHz which is cover from 1200 - 2400 MHz, with VSWR values at a frequency of 1300 MHz is 1.678. The width of the late time ringing duration is 6 ns with the value of the range of ringing level obtained -128 till -30.09 dB. The design and realization results show that the antenna fulfil the antenna characteristic for the intended GPR application.

Keywords: GPR, bowtie antenna, self-complementary, resistive loaded, bandwidth, ringing level.