

ABSTRACT

Ground Penetrating Radar (GPR) is a technology that utilizes radio waves to detect the location, depth, and shape of objects buried beneath the earth's surface. One of the important components of the GPR system is the antenna, which consists of transmitter and receiver antennas. Antennas required by GPR systems have wide bandwidth specifications, unidirectional radiance patterns, and low level ringing. This study designed bowtie antennas that can work on GPR systems as well as analyzed comparison results of antenna characteristics such as bandwidth, radiation patterns, VSWR and returnloss from simulated results and realized antenna measurements.

The design uses a bowtie type antenna with an antipodal structure and the addition of edge cutting and matching impedance methods that work at a frequency of 1.6 GHz. The addition of antipodal structure, edge cutting on the patch antenna and matching impedance aims to increase the bandwidth value and reduce the ringing effect. The required bandwidth value is 20% greater than the fractional bandwidth of the antenna.

The design is simulated using software and fabricated using FR-4 Epoxy as a substrate material with a dielectric constant of 4.3 and a thickness of 1.6 mm. The antenna is designed to work at a frequency of 1.6 GHz. The results of the realization of the antenna have results that can meet the desired specifications, namely having a bandwidth value of 540 MHz in the range 1.32 GHz - 1.86 GHz, a return loss value of -16.38 dB and a VSWR of 1.35 at a frequency of 1.6 GHz and a pattern bidirectional radiation.

Kata Kunci: Antipodal, Bowtie Antenna, Edge Cutting, Ground Penetrating Radar (GPR), Matching Impedance.