

ABSTRACT

Ground Penetrating Radar (GPR) is one technology that utilizes a radar system to determine the location of objects that are below the surface of the ground. However, a problem that often occurs is the difficulty of finding an accurate location of objects under the ground because of the thickness of the soil. This final project designs and realizes a transmitting antenna which is a bowtie antenna with AMC on a ground plane that operate at a frequency of 2.1 GHz. This Final Project uses Artificial Magnetic Conductor (AMC) as a ground plane to get high gain, increase bandwidth, and produce a low-profile antenna for GPR antennas system.

This Final Project uses Artificial Magnetic Conductor (AMC) as a ground plane to get high gain, increase bandwidth, and produce a low-profile antenna for GPR antennas. Antennas for GPR have Ultra Wide-Band (UWB) characteristics with fractional bandwidth values $\geq 25\%$. In addition, the value of late-time ringing must also be reduced to -30 dB so as not to cause a masking effect on the detected object. The masking effect is the main reflected wave of the object or target is covered by unwanted wave.

This Final Project uses software for bowtie antenna design and realizing the antenna using a dielectric substrate RT Duroid 5880 with a dielectric constant (ϵ_r) of 2.2 and thickness (h) 1.57 mm. The ground-plane layer is designed using an Artificial Magnetic Conductor (AMC) with an FR-4 Epoxy substrate with a dielectric constant (ϵ_r) of 4.3 and a thickness (h) of 1.6 mm. The bowtie antenna is operated in the range from 1,6 to 2,6 GHz. Microstrip line technique was chosen in this Final Project due to a simpler fabrication process. The antenna realization results show that the antenna has a bandwidth of 510 MHz, return loss of -15.17 dB and VSWR 1.15 for transmit power efficiency. The radiation pattern on the bowtie antenna with AMC is unidirectional with a gain of 4.351 dB. However, the ringing level becomes high by -19.18 dB. Thus, the results of the design and realization of bowtie antennas using AMC have not fully met the expected specifications for the use of GPR system antennas, especially at the ringing level value.

Keywords: *Ground Penetrating Radar (GPR), Artificial Magnetic Conductor (AMC), antenna bowtie.*