ABSTRACT

Identifying the thickness of each layer in a layered structure is something that is often done in the construction field. Measurement of layers of concrete and asphalt on roads, measuring the thickness of building foundations in factory buildings, and measuring the thickness of culverts in the soil are examples of measuring layered materials. In the construction process, there are still many size inaccuracies between materials, so that it will cause damage to other materials. To determine the size of the layered material without using a certain method, it will be difficult to do. Ground Penetrating Radar (GPR) is a method for measuring layer thickness which has several advantages, including being non-destructive and can be used for large areas and in a shorter time.

In this final project, an experiment of measuring the thickness of the layered soil material is carried out, using the GPR system modeled with a pocket vector network analyzer (VNA) tool. The working frequency range used is 300 Mhz – 4 Ghz. The GPR model is realized with a bisstatic configuration with antennas on the transmitter and receiver using Vivaldi antennas. The estimation of the layer thickness is based on the detection data in the form of a B-Scan.

The experimental results show that the target model with a thickness of 10 cm sand layer and 10 cm clay layer has an average accuracy rate of 81.03%. The target model with a sand layer thickness of 20 cm and 10 cm for a clay layer has an average accuracy rate of 89.155%. The target model with a thickness of 3 layers, namely 25 cm rock layer, 25 cm sand layer and 10 cm clay layer has an average accuracy rate of 79.936%.

Keywords: Ground Penetrating Radar (GPR), Radar, Layered Material, Soil Layer.