

ABSTRACT

Concrete is the main ingredient that is often used in the construction world. Buildings, roads, foundation poles are some examples in the use of concrete. In the construction process, there is still a lot of damage in concrete one of the example is damage to the reinforcing concrete. The number of cracks or cavities in the concrete makes water enter and soak the reinforcing iron. This is what causes corrosion of the steel reinforcement which can trigger the break in the reinforcement. Ground Penetrating Radar has (GPR) the potential to be used in detecting such damage.

In this final project, modeling the GPR system using a Vector Network Analyzer to detect damage to concrete. The use of antennas is modeled with a bistatic configuration using Vivaldi antennas on the transmitter and receiver parts. This test is carried out with several stages, namely the manufacture of test media, experimental simulations, retrieval of experimental data, processing of experimental results and analysis of each damage condition.

The Experimental test results show that the GPR system simulation using gprMax B-Scan signal output with a working frequency of 550 MHz, the depth of the objects from the four B-Scan output simulations have depth accuracy according to the time of the object reflection of 66% in each condition, for the detection of gaps by 75 % with a minimum distance of the gap is 10 cm, and the detection length of the gap length of 50% from all four simulations. The use of a working frequency range of 300 MHz - 8 GHz can detect the gap between concrete reinforcement in direct measurements. The results of measurements of cavity detection between concrete reinforcement by C-Scan are able to show similarities with concrete construction designs.

Keywords: GPR, Radar, Antena, Concrete Damage, Reinforced Concrete, Concrete.