ABSTRACT

Ground Penetrating Radar (GPR) is a radar used to detect an object buried under the ground surface at a certain level of depth using electromagnetic radiation in the microwave band, Ultra High Frequency (UHF) / Very High Frequency (VHF) without causing damage (non-destructive) on the surface. According to the function of the filter which can do frequency selection on a system, the need for a filter connected on the block next to the antenna in a GPR circuit is necessary. This filter helps the system to check and select the transmitted frequency and received frequency from the antenna.

In this thesis, microstrip structure is applied in filter design to obtain ultra-wideband (UWB) characteristic and to provide compact shape. The design of a two-patch case composite bandpass filter is proposed to fulfill the requirement. The design utilizes a combination of a stepped-impedance low-pass filter as the upper stopband and quarter-wave high pass filter to realize the lower stopband. A simulation and realization are conducted on a dielectric substrate having a relative permittivity of 4.4 and 1.6 mm of thickness, followed by optimization.

The results show that the proposed filter have a good performance and produce 980 MHz wideband bandpass filter from 1.394-2.371 GHz with center frequency at 1.873 GHz, return loss less than -10 dB, and sharp rejection.

Keywords: Composite BPF, Microstrip filter, GPR, UWB.