

## ABSTRACT

Landslides are natural disasters that cannot be predicted. This natural disaster caused many fatal losses. To reduce the detrimental impact caused by landslides, an early detection system is needed, in this study a radar system is used to detect any ground movement. Monitoring ground movement on the area of the landslide is detection of shifts on a small scale and requires radar signals with wide bandwidth or narrow pulses in certain areas, so in this study using Frequency Modulation Continuous Wave (FMCW).

One of the important components in the director is the filter to improve the performance of the radar system so that it can produce the desired output. In this research, *Band Pass Filter* (BPF) will be designed which works on the frequency band K (Ku band). The filter works about the frequency 16.75 to 17.25 GHz using the microstrip based hairpin method. This filter must have a sharp slope so that it uses a reconfiguration frequency chebyshev and has a bandwidth of 500 MHz with a value of insertion displacement 3 dB and retraction loss 15 dB with the *Rogers Duroid RT5880* substrate material with a 2.2 dielectric constant value.

The simulation results obtained show the filter performance in the middle frequency of 17 GHz with a bandwidth of 500 MHz with an insertion value of 0.599 dB and return loss of 18,636 dB. The measurement results show the filter performance in the middle frequency of 17 GHz with the response value of return loss 25.04 dB and the response value of insertion loss 3.7 dB.

**Keywords:** Radar FMCW, Filter, Hairpin.