

ABSTRACT

Ground Penetrating Radar (GPR) is an electromagnetic method with high frequency and resolution. Ground Penetrating Radar (GPR) exploit electromagnetic wave radiation at band spectrum frequency range of 40 MHz up to several GHz to identification the reflection shape from underground with penetration deeps. The transmit pulse will be differ because characteristic each underground layer is different (depend on dielectric constant each layer). The received reflection pulse converted to digital by Analog to Digital Converter (ADC). Output of this ADC can give profit in Digital Signal Processing (DSP) to identification object more detail.

ADC that uses in this GPR systems is *Sequential Fast ADC*. It is because this GPR use frequency 1 GHz (frequency selection base on operational frequency of GPR and penetration deeps) so needs high sampling rate and resolution. Unit of *Sequential Fast ADC* consist of sampling, quantization, and encoding. To compare resemblance between digital signals and analog signals so the digital signals must convert to analog by interpolation polynomial.

In this paper was compared the effect of dynamic range GPR signals to Signal to Quantization Noise Ratio (SQNR). The effect of uniform and non-uniform quantization to quantization error. The effect of sampling rate (oversampling) and quantization levels to interpolated signals.

From the simulation dynamic range of GPR signal must appropriate with dynamic range of ADC. The quantization that compatible with GPR is uniform quantization, the resolution (number of bit) of ADC that effective for GPR is 8 bit and the Oversampling (space between samples was closed) make the error reconstruction decrease. Linear interpolation is the sufficient method to reconstruction the GPR signal.

Keywords: Ground Penetrating Radar (GPR), Analog to Digital Converter (ADC), SQNR, Dynamic Range, Interpolation, and Reconstruction Signal.