ANALYZING THE IMPACT OF UTILITY PARABOLIC IMAGES WITH DIFFERENT SCAN BASED ANGLES USING GROUND PENETRATING-RADAR (GPR)

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

This study investigated the impact of utility parabolic images with different scan-based angles using Ground Penetrating Radar (GPR). Ground Penetrating Radar is a near-surface geophysical technology that produces high-resolution images of the dielectric characteristics of the top few tens of meters of the Earth's subsurface. It has been extensively employed in contaminant hydrology, underground utility detection, and grave/tomb location. With the increasing accessibility and utilization of GPR in engineering applications, a significant amount of data has been collected. The operation of GPR involves emitting high-frequency pulsed electromagnetic waves into the ground and capturing the reflections from subsurface discontinuities. B-scan images of GPR typically exhibit two pattern shapes: hyperbolic curves, resulting from objects with cross-section sizes comparable to the radar pulse wavelength, and linear segments, originating from planar interfaces between layers with different electrical impedance. This study addressed the problem of variability in scan-based angles used during GPR surveys, which can affect the quality of parabolic images in radargrams. The researchers aimed to identify the most suitable scan-based angle for obtaining high-quality data by exploring the impact of different scan-based angles on utility parabolic images. On-site data collection was conducted using GPR with frequencies of 250MHz and 800MHz, considering the specific angles required for each frequency. The research team ensured proper data collection techniques to achieve reliable and optimal data acquisition. The results highlighted the differences in radargrams obtained from the two frequencies, providing valuable insights into the influence of scan-based angles on utility parabolic images. This research contributes to the understanding of optimizing GPR surveys for utility detection and mapping, thus enhancing the accuracy and efficiency of subsurface investigations.

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