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Buried Pipe Detection Under the Road by High Resolution Frequency Domain GPR

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Abstract

In this paper, ground-penetrating radar (GPR), which has the capability to do non-destructive testing (NDT) in civil engineering field, is proposed to detect underground gas pipes, water pipes, electric cables or voids under a road. SFCW (Stepped Frequency Continuous Wave) radar, which is based on vector network analyzer, is utilized for target detection and its performance is investigated. Since signal processing is vital for targets reorganization and clutter rejection, we categories the signal processing method into two phases. In first phase, the numbers of the frequency domain radar data traces underwent CPM (Combined Processing Method) to obtain two dimensional time domain data. In second phase, the two-dimensional time domain data was processed by SAR (Synthetic Aperture Radar) method to obtain the three dimensional image of the pipes. The field experiment was performed on a gravel road with an asphalt layer at a road construction company's test site in Saitama-shi, Japan and all the signal-processing results are presented.

 Keywords: [GPR](#), [SFCW Radar](#), [FFT](#), [MUSIC Algorithm](#), [SAR](#), [Super Resolution Signal & Image Processing](#)
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