Compressed Sensing (CS) Techniques for Image Recovery from Sparse Measurement

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ABSTRACT
This paper evaluates Compressed Sensing (CS) techniques for image recovery from sparse measurement of wide-band microwave synthetic aperture radar. A specimen under test (SUT) consists of a tray of small rocks of different densities and with/without one piece that is wrapped in aluminum foil. The fully-sampled measurements of the SUT are randomly undersampled in the space domain and the images are reconstructed from measurements of 10% -- 50% sparse-sampling rates using conventional zero-filling (ZF) and NUFFT methods in comparison to the advanced CS method. The results show that the CS method achieves good image quality with as low as 30\% sparse-sampling rate, while ZF and NUFFT require 50\% to obtain acceptable quality. The reduction of spatial measurement leads to reduced cost or reduced measurement time.