Stochastic collocation introduction into correlation functions method applied for underground objects

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Abstract

A method of space-ensembles and time-ensembles correlations functions technique applied on GPR B-scan raw data, prove to result in detailed information for tracking buried objects. These computations help in sites allocations by TESCs and time stamps of objects scattering by SECFs which are precisely consistent with simulation results. While these results applied for given data stack, randomness in physical parameters of tested ground always occurs. An introduction of randomness to the physical parameters of tested models by creating Stochastic Collocations (SC) ensembles incorporating randomness to B-scan via successive A-scans, SC-SE and SC-TE ensembles enables Sensitivity Analysis (SA) study of GPR raw data which gives a tool to change physical properties of the ground in search for better ground matching. This method can be added to GPR machines or simulation software to enhance raw data analysis. A field experiment of small non-metallic objects allocation was carried out as a platform for assessing the realistic performance of the method.