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\begin{center} MUSIC Algorithms for Rebar Detection \end{center}

G. Leone and R. Solimene

Seconda Università di Napoli, Information Engineering, Aversa, Italy (giovanni.leone@unina2.it)

In this contribution we consider the problem of detecting and localizing small cross section, with respect to the wavelength, scatterers from their scattered field once a known incident field interrogated the scene where they reside.

A pertinent applicative context is rebar detection within concrete pillar. For such a case, scatterers to be detected are represented by rebars themselves or by voids due to their lacking. In both cases, as scatterers have point-like support, a subspace projection method can be conveniently exploited [1]. However, as the field scattered by rebars is stronger than the one due to voids, it is expected that the latter can be difficult to be detected.

In order to circumvent this problem, in this contribution we adopt a two-step MUltiple SIgnal Classification (MUSIC) detection algorithm. In particular, the first stage aims at detecting rebars. Once rebar are detected, their positions are exploited to update the Green's function and then a further detection scheme is run to locate voids. However, in this second case, background medium encompasses also the rabars.

The analysis is conducted numerically for a simplified two-dimensional scalar scattering geometry. More in detail, as is usual in MUSIC algorithm, a multi-view/multi-static single-frequency configuration is considered [2].

1. Baratonia, G. Leone, R. Pierri, R. Solimene, "Fault Detection in Grid Scattering by a Time-Reversal MUSIC Approach," Porc. Of ICEAA 2011, Turin, 2011.

2. E. A. Marengo, F. K. Gruber, "Subspace-Based Localization and Inverse Scattering of Multiply Scattering Point Targets," EURASIP Journal on Advances in Signal Processing, 2007, Article ID 17342, 16 pages (2007).