Scalar and vector linear inverse scattering techniques for non-destructive evaluation of concrete buildings

K. Mayer, K.J. Langenberg, R. Marklein, *University of Kassel, Germany*

Abstract

A German group of researchers on the field of non-destructive testing of concrete buildings has teamed up under the lead management of the 'Institut für Werkstoffe im Bauwesen' at the University of Stuttgart to a research group founded by the German Research Foundation (DFG). The goal is to focus the know-how on that topic to gain a common progress in the field of non-destructive testing of large concrete objects. The breakdown of the ambitious tasks of measuring, evaluation under the assistance of simulation techniques and the assessment of results leads to a focusing of the know-how of each group under the common and very exciting goal of the improvement of the estimation of the security and the lifetime of very expensive buildings like bridges of reinforced concrete.

This presentation deals with the partial results of the University of Kassel with the emphasis on modelling and imaging.

Starting from the analysis of the problematic of the scattering of waves in heterogeneous media, applications of SAFT (Synthetic Aperture Focusing Technique) – a NDT equivalent method to the seismic Kirchhof migration - and the derivate FTSAFT which is derived from the Fourier Diffraction Slice Theorem for the application to electromagnetic (Ground Penetrating Radar -) experiments to the locating of tendon ducts are shown. Variations for the inversion of electrical and elastic measurements which are developed by the authors are validated against their usefulness for the inspection of the inner of tendon ducts to find grouting defects, which will lead to corrosion of the cables in the duct.