



GPR and Microwave Tomography in Archaeology and Cultural Heritage diagnostics

Francesco Soldovieri, Ilaria Catapano, Gianluca Gennarelli, Antonio Affinito, and Lorenzo Crocco
Istituto per il Rilevamento Elettromagnetico dell' Ambiente, Consiglio Nazionale delle Ricerche, Napoli, Italy
(soldovieri.f@irea.cnr.it)

Ground penetrating radar (GPR) is a well assessed technology in archaeological prospecting and cultural heritage diagnostics due to its capability of providing high-resolution images (from centimetres to few metres) of the interior of the investigated region (f.i., underground and manmade structures).. In this framework, the main concern related to the use of GPR regards the low interpretability of the raw data and data processing approaches based on physical based models of the electromagnetic scattering are worth to be considered.

In the last years, part of the authors' research activities has been focused on the development of 2D and full 3D microwave tomographic approaches able to deal with different scenarios and measurement configurations [1,2]. In these approaches, the targets are looked for as electromagnetic anomalies with respect to the background medium and the scattering phenomenon, which is at the basis of the sensing, is modeled according to a linear approximation. Hence, the imaging is faced as a linear inverse scattering problem and solved by using regularization schemes.

The effectiveness of these approaches in archaeological surveys and cultural heritage monitoring have been widely investigated and few relevant experiences at important archaeological sites will be presented at the conference.

[1] I. Catapano et al. "Full three-dimensional imaging via ground penetrating radar: assessment in controlled conditions and on field for archaeological prospecting", *Applied Physics A* 115 (4), pp. 1415-1422, 2014.

[2] I. Catapano et al., "Microwave tomography enhanced GPR surveys in Centaur's Domus, regio VI of Pompei, Italy", *J. Geophys. Eng.*, vol. 9, pp. 92-99, 2012.