

COST Action TU1208

Advanced Ground Penetrating Radar Signal Processing Techniques **Special Issue of the Elsevier Journal "Signal Processing"**

Call for Papers

Ground penetrating radar (GPR) is a non-destructive geophysical method that uses electromagnetic waves to image the subsurface. A typical GPR system has three main components: transmitter and receiver, directly connected to the transmitting and receiving antennas, and a control unit. Electromagnetic pulses are transmitted into the subsurface and the earth response is recorded. The GPR method is characterized by the rapidly decaying amplitude of the electromagnetic waves, together with the loss of the relevant higher frequency harmonics. Thus, GPR data are highly non-stationary and processing is inherently a challenge.

GPR technology has seen tremendous progress in its range of applications, as well as in the analysis and processing algorithms, over the past 20 years. GPR applications currently include sedimentology, ground-water contamination, glaciology, archaeology and cultural-heritage management, civil and geotechnical engineering, planetary exploration, demining, and more. Even though there is an undoubted promise for this technique regarding the most of the above-mentioned applications, the most successful results have come from glaciology, archaeology and civil engineering.

Particularly promising for geophysical studies, GPR is also characterized by notoriously difficult automated data analysis. GPR signal processing and subsequent display/presentation of the results are of paramount importance to GPR operators and end-users. They should be considered as an integrated part of the methodology, as well as a prerequisite for successful surveying and data interpretation.

In April 2013, the TU1208 COST (European Cooperation in Science and Technology) Action "Civil Engineering Applications of Ground Penetrating Radar" has officially started. This Action focuses on the exchange of scientific-technical knowledge and experience of GPR techniques in civil engineering. The Action is establishing and strengthening active links between universities, research institutes, companies and end users working in the field, fostering and accelerating its long-term development in Europe. It is also having a strong impact in promoting throughout Europe a wider and more effective use of this safe and non-destructive inspection method. The Action is now in progress and the leading Guest Editors of this Special Issue are coordinating the scientific activities of Project 3.4, focused on the "Development of advanced GPR data-processing algorithms." Such Project is part of Working Group 3 of the Action, which is dealing with the improvement and implementation of accurate and fast electromagnetic-scattering methods for the characterization of GPR scenarios, imaging and inversion techniques, and effective data-processing algorithms for the elaboration of GPR data collected during civil-engineering surveys. Based on the outcomes of the Action's meetings and other networking activities, the leading Guest Editors proposed to publish a Special Issue related to the state-of-

the-art in advanced GPR data processing as it is today.

The main scope of this special issue will be to provide to the reader a deep understanding of the state of the art and open issues in the field of GPR signal processing techniques. This is the reason why reviews will also be included. Our intention is also to collect in this special issue papers related to the most recent advanced GPR signal processing techniques used in the principal application fields (e.g. civil and environmental engineering).

Accordingly, we invite the submission of papers dealing with the following topics:

- Non-linear GPR signal processing
- Signal processing for clutter reduction and increase of the SNR for GPR data
- GPR signal and image processing techniques for GPR data interpretation
- Velocity and attribute analysis
- Low complexity methods for real-time GPR signal processing
- Frequency dependent attenuation analysis

Submission Deadline: December 30th, 2015

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