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# Qualitative-enhanced full-waveform inversion of ground penetrating radar data

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Ground penetrating radar (GPR) prospection of underground scenarios is proven useful in numerous fields, from geophysics to structural engineering. At present, most of the typically deployed approaches make use of qualitative processing of GPR data [1]. Nevertheless, despite their increased complexity, full-waveform inversion (FWI) methods are emerging as a key tool to provide a complete characterization of the buried region under test [2].

This contribution aims at presenting an innovative qualitative-enhanced FWI strategy that combines the benefits from these different classes of GPR processing methods. In more detail, on the one hand a synthetic aperture-based technique retrieves a first qualitative map of the buried structures. On the other hand, the dielectric properties of buried targets are found by an FWI approach formulated in the unconventional context of nonconstant-exponents Lebesgue spaces [3]. The FWI procedure exploits the qualitative map for guiding the unknown update, as well as for constructing the nonconstant-exponent function. Both numerical and experimental results are discussed to assess the proposed inversion procedure.

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