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and Numerical Modeling of the Transient ElectroMagnetic Method

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The Transient ElectroMagnetic Method (TEM) technique is one of the geophysical techniques used in on-site inspection. This work focuses on the mathematical and numerical modeling of this technique.
The numerical simulation made it possible to predict the response of the sensor. With the treatment of several underground configurations, the expert can acquire a good experience of interpretation, which is very difficult in the case of a real situation.
This work consists in modeling the TEM. The system consists of a single dual-function sensor (transmission and reception). The method consists in supplying a conductive loop with direct electric current. Once the current is established, a sudden cancellation of this current is performed. The induced currents are injected by induction into the stratified underground medium. The voltage produced by the induced currents provides information on this environment. To model this system, we used the finite element method. A characterization of the stratified media was carried out by measuring the response of the sensor after the cancellation of the current pulse, then an inversion model using an optimization method based on genetic algorithms is presented.

E-mail

zaoui_abdelhalim@yahoo.fr

Promotional text

Mathematical and numerical modeling provide great support for the interpretation phase. In the real case, where the inspector has a confusion in the interpretation of the inspection data, he can use the computer simulation to check if his interpretation proposal is correct.

Oral preference format

Primary author: Mr ZAOUI, Abdelhalim (École Nationale Supérieure de Technologie (ENST))

Co-author: Ms KHARROUBI, Fatima (University of Bedjaia)

Presenter: Mr ZAOUI, Abdelhalim (École Nationale Supérieure de Technologie (ENST))

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