SIGNIFICANTLY INCREASING TEM SURVEY PERFORMANCE BY MODIFYING FREQUENCY CONTENT OF TRANSMITTER WAVEFORM

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TEM surveys typically operate with a simple transmitter waveform, such as a 50% duty cycle alternating square wave. The frequency of transmission and the duration of measurement is decided before the survey or, frequently in the case of ground TEM surveys, adapted during the survey by the operator to suit the conditions.

With some sensor types in particular, achieving good quality data throughout all parts of the decay is difficult. Additionally, all surveys can be complicated by the presence of external sources of interference such as power transmission lines. We argue that significant improvements can be made by optimising the frequency content of the transmitter waveform. Additionally, in the case of ground surveys, the duration of an individual reading can be controlled in order to achieve rapid production and desired data quality. Variables are the EM noise spectrum (a function of the sensor and environment) and the conductivity of terrain. These change along the TEM profile and best results are obtained by regular re-evaluation in light of the target sought.

There are several options available to modify the effective frequency content of a TEM transmitter waveform. For a conventional square wave transmitter, an irregular pattern of polarity reversals can be transmitted. Another method is to use two or more base frequencies sequentially. The survey can be automated and data can be combined automatically into a single decay with optimal signal-to-noise ratio over the entire decay.

Theoretical examples and field data are presented to illustrate improvements in performance.

PRESENTER PROFILE

Andrew Duncan is the Managing Director of ElectroMagnetic Imaging Technology Pty Ltd (EMIT) and Absolute Geophysics Pty Ltd, based in Perth, WA. EMIT's products include the SMARTem electrical methods receiver system, Maxwell EM software and the Atlantis borehole magnetometer tool for EM. Absolute Geophysics operates a unique total field EM system with particular utility in nickel exploration. Andrew has a background in the development of technology for electrical geophysics, EM in particular. His experience includes the development of airborne EM systems and distributed systems for geophysical measurements. One of his interests is EM techniques for highly conductive targets.
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