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Denoising Transient Electromagnetic Data

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Abstract : Transient electromagnetic (TEM) data plays a crucial role in hydrogeological and environmental applications, providing valuable insights into geological structures and resistivity variations. However, the presence of noise often hinders the interpretation and reliability of these data. Our study addresses this issue by utilizing a FASTSNAP system for the TEM survey, which operates at different modes (low, medium, and high) with continuous adjustments to discretization, gain, and current. We employ a denoising approach that processes the raw data obtained from each acquisition mode to improve signal quality and enhance data reliability. We use a signal-averaging technique for each mode, increasing the signal-to-noise ratio. Additionally, we utilize wavelet transform to suppress noise further while preserving the integrity of the underlying signals. This approach significantly improves the data quality, notably suppressing severe noise at late times. The resulting denoised data exhibits a substantially improved signal-to-noise ratio, leading to increased accuracy in parameter estimation. By effectively denoising TEM data, our study contributes to a more reliable interpretation and analysis of underground structures. Moreover, the proposed denoising approach can be seamlessly integrated into existing ground-based TEM data processing workflows, facilitating the extraction of meaningful information from noisy measurements and enhancing the overall quality and reliability of the acquired data.

Keywords : data quality, signal averaging, transient electromagnetic, wavelet transform
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