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瞬变电磁拟地震子波宽度压缩研究

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Study of sharpen the wave-form of TEM pseudo-seismic

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摘要

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摘要 导电媒质中电磁场所满足的扩散方程与无耗媒质中电磁场所满足的无阻尼波动方程之间存在着数学转换关系式,可以实现瞬变电磁法拟地震资料解释.但是转换出的虚拟波往往波形较宽,使分辨能力下降,影响了瞬变电磁拟地震方法的发展和推广.本文针对虚拟波形展宽这一现象进行了研究,认为虚拟波形展宽的原因,不是由于波在介质中传播时能量损耗所致,而是波场变换式中核函数随虚拟时间的增加,分布范围增大的特点导致的.然后提出利用反褶积技术,消除波场变换中的波形展宽效应.对已知模型的计算求解和处理,取得较好的效果.证明了瞬变电磁拟地震方法可以增强识别地下电性分界面的能力.

关键词: 瞬变电磁场 波场变换 压缩波形 反褶积

Abstract: Because of the relationship between diffusion field of electromagnetic wave in conductive medium and electromagnetic wave equation in lossless medium,transient electromagnetic (TEM) method pseudo-seismic technology can be realized and wavelet can be transformed accordingly. But the transformed virtual wave is often with wide waveform, which reduces the resolution and affects the development and promotion of pseudo-seismic method. In this paper, we studied waveform broadening phenomena of virtual wave. Firstly, we discussed the reasons for virtual waveform broadening phenomena, pointed out that it is not due to the energy loss when wave propagates in the medium, but because that the propagation velocity of virtual wave in the virtual medium is much smaller than the velocity of electromagnetic wave propagating in the physical medium. Secondly, we put forward an idea that uses deconvolution technology to eliminate the waveform broadening effect in the wave-field transformation. We also computed and processed several known models and achieved good results which proved that the TEM method pseudo-seismic technology can enhance the capacity of TEM method to identify the underground electrical interface so that makes the transient electromagnetic method in fine exploration possible.

Keywords: Transient electromagnetic field Wave-field transformation Sharpen wave-form De-convolution

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