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偏移成像

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最小平方逆时偏移真振幅成像

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True-amplitude imaging based on least-squares reverse time migration

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摘要

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摘要 针对常规逆时偏移算法具有较强的低频噪声、对观测系统要求较高、较难进行透射损失补偿等问题, 本文在构建线性化波动方程算子(反偏移算子)的基础上, 详细推导了最小平方逆时偏移迭代算法, 在反演的理论框架下解决了上述问题的影响, 实现了真振幅成像。通过简单多层介质模型及复杂Marmousi模型试算, 验证了最小平方逆时偏移在真振幅成像方面的优势。实验结果表明, 此法不仅具有更高的成像分辨率, 而且还能有效地压制成像噪声。

关键词: 逆时偏移 真振幅 最小平方偏移 线性反演

Abstract: Conventional reverse time migration (RTM) has disadvantages such as low frequency imaging, heavy noise, high requirements for acquisition, lack of compensating transmission losses and etc. In this paper, we propose a method for true-amplitude imaging based on least-squares reverse time migration. We treat the true-amplitude imaging as a linear inversion problem. Firstly, we derive the linearized wave propagation operator which is also called de-migration operator, and then we do some theoretical derivation on least-squares reverse time migration (LSRTM). Numerical tests on a multi-layer model and Marmousi model prove that LSRTM obtains true-amplitude imaging with higher imaging resolution than conventional reverse time migration, and the noise was also well suppressed.

Keywords: reverse time migration true-amplitude least-squares migration linear inversion

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