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论文

共炮检距道集波动方程保幅叠前深度偏移方法

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摘要 本文提出了一种基于双平方根算子的共炮检距道集波动方程保幅叠前深度偏移方法，将振幅误差补偿作为偏移的一部分与“运动学偏移”一起在偏移过程中实现.其基本内容包括：(1)从保幅的单平方根算子方程出发，推导出由双平方根算子定义的保幅单程波方程；(2)根据地震波摄动理论把速度场分裂为层内常速背景和变速扰动，分别在频率－波数域和频率－空间域求得波场深度延拓的偏移时移量及振幅校正系数，从而得到最终的DSR保幅波场延拓算子；(3)在高频假设条件下，把DSR保幅波场延拓公式中的积分运算进行稳相近似，得到保幅波场延拓的相移公式.理论分析和模型数值试验表明，该方法不但可以使散射能量聚焦、归位，提高成像精度；而且可以输出正确反映地下反射系数的振幅信息，为后续的地震属性分析（如AVO/AVA）提供更真实的地震信息.

关键词 保幅偏移 单程波方程 单平方根算子 双平方根算子 稳相近似

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The method of wave equation preserved-amplitude prestack depth migration for common offset gathers

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Abstract This article proposes a wave equation preserved-amplitude prestack depth migration method for common offset gathers based on double-square-root equation. In this method, amplitude errors compensation is regarded as one part of migration and can be accomplished with “kinematics migration” during the migration. Its basic theory is as follows. (1) We can derive preserved-amplitude one-way wave equation defined by double-square-root(DSR) operator from the equation of preserved-amplitude single-square-root operator; (2) According to the perturbation theory of seismic wave, we split the velocity field into intraformational constant velocity background and variable velocity disturbance. Then we calculate time-shift quantity of migration and amplitude correction coefficients for wavefield continuation in frequency-wave number domain and frequency-spatial domain ,respectively. So we obtain the final DSR preserved-amplitude field continuation operation. (3) The phase-shift formulae for preserved-amplitude wave field continuation can be obtained by stationary phase approximation for integral operation of DSR preserved-amplitude wave field continuation formulae in a condition of high-frequence hypothesis. The theoretic analysis and models on synthetic datasets show that the proposed method not only can focus scattering energy, turn over to the correct position and improve the imaging fidelity, but also can output the correct amplitude information which exactly reflects underground reflection factor. So this method can provide more real seismic information for the following attribute analysis, such as AVO/AVA.

Key words preserved-amplitude migration; one-way wave equation; single square root operator ; double square root operator; stationary phase approach

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