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波动方程叠前深度偏移直接产生角道集

刘礼农, 张辉, 张剑锋*

中国科学院地质与地球物理研究所, 中国科学院油气资源研究重点实验室, 北京 100029

Angle gathers for one-way wave equation shot-record migration methods

LIU Li-Nong, ZHANG Hui, ZHANG Jian-Feng*

Key Laboratory of Petroleum Resources Research, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China

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摘要

基于单程波深度延拓算法,得到震源波场在成像点的入射角度,结合对地层倾角的估计,获得入射地震波与界面法线的夹角.通过运用"保幅"的反褶积成像条件和考虑累加的炮数,解决了炮点覆盖不均匀导致的成像幅值误差问题,进而建议了炮域波动方程叠前深度偏移直接产生角道集的方法和流程.与基于空间移动或时移成像条件的波动方程叠前深度偏移提取角道集的方法相比,本文建议的方法只需少量额外的存储空间,又可补偿观测系统非均匀覆盖对成像幅值的影响;其增加的计算量与炮域偏移算法相比几乎可以忽略.文中算例表明,本文方法提取的角道集可为叠前反演提供较精确的AVO振幅特性.此外,就改善地震成像效果本身而言,提取角道集使得可在波动方程叠前深度偏移中应用剩余动校和拉伸切除技术,从而可更好地保持高频成分并提高成像的信噪比.

关键词 单程波方法, 入射角, 角道集, 炮域偏移, 剩余动校

Abstract:

The reflect angle can be computed by the combination of the formation dip angle with the incident angle field gotten with the proposed one-way wavefield continuation method. We propose a ADCIGs (Angle Domain Common Image Gathers) generation scheme for one-way wave equation shot-record migration methods. We overcome the imaging amplitude error resulting from the diversity of shot coverage by employing the amplitude-preserved deconvolution imaging conditions and taking account of stacking shot number. Comparison with other ADCIGs generation schemes based on spatial or time shift imaging condition, the proposed scheme is free of huge memory requirement, expensive computation cost (i.e. the additional computational cost of the proposed ADCIGs generation scheme can be omitted in contrast to that of the depth migration) and amplitude error resulting from the uneven shot coverage. The examples present here demonstrate that the ADCIGs generated by the proposed scheme supply the accurate AVO amplitude characteristics for prestack inversion. Furthermore, the residual NMO correction and mute can be easily applied on the produced ADCIGs, which lead to high frequency component enhancement and higher S-N ratio of one-way wave equation prestack depth migration section.

Keywords One-way wave equation, Incident angle, Angle gather, Shot-profile migration, RNMO

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