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非零偏VSP弹性波叠前逆时深度偏移技术探讨

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Discussion about reverse-time depth migration technology of prestack elastic wavefield for offset VSP data

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摘要

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摘要 非零偏VSP地震资料是一种多分量资料,处理非零偏VSP资料,弹性波叠前逆时深度偏移技术无疑是最适合的处理技术.本文从二维各向同性介质的弹性波波方程出发,研究了对非零偏VSP资料进行叠前逆时深度偏移的偏移算法,讨论了逆时传播过程中的边值问题和数值频散问题及其相应的解决方案;采用求解程函方程计算得到地下各点的地震波初至时间作为成像时间,实现了非零偏VSP资料的叠前逆时深度偏移.最后进行了模型试算和非零偏VSP地震资料的试处理,结果表明该方法不受地层倾角限制,较适用于高陡构造地区或介质横向速度变化较大地区的非零偏VSP地震资料处理.

关键词 非零偏VSP, 各向同性介质, 弹性波场, 纵波, 转换波, 叠前逆时深度偏移

Abstract: Offset VSP seismic data is a kind of multicomponent data, the elastic prestack reverse-time depth migration technology is no doubt the best suitable for processing offset VSP data. This paper studied prestack reverse-time depth migration algorithms based on elastic wave equation in 2D isotropic media for offset VSP data, and discussed the boundary value problems and frequency dispersion problems and their relevant solution in wavefield reverse-time propagation, then used the solution of eikonal equation to get the one-way traveltimes from the source to each point in the image space, which is regarded as the image time at that point, and complemented the prestack reverse-time depth migration for offset VSP data. Finally, we carried out model test and processed offset VSP data. The processing results proved that the scheme is not influenced by lay inclination and suited to process offset VSP data from the areas with steep subsurface structures and big variation of horizontal velocities.

Keywords [Offset VSP](#), [Isotropic media](#), [Scalar elastic wavefield](#), [P-wave](#), [Converted wave](#), [Prestack reverse-time depth migration](#)

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