

应用地球物理学

电阻率和速度随机分布的MT与地震联合反演

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摘要 在已有研究成果的基础上,为了适应性参数剧烈变化的复杂模型并满足联合反演的要求,开发了速度和电阻率随机分布共网格单元模型的建模技术.基于这种统一的物性随机分布的网格介质模型,利用有限元方法和改进的射线追踪法分别正演计算大地电磁场和地震走时,结合改进的模拟退火算法,研究实现了电阻率和速度随机分布条件下的大地电磁与地震资料的同步联合反演.对物性界面不完全一致和物性变化剧烈的带地形复杂模型的试验,表明了该方法在精细反演复杂电阻率和速度结构方面的效果,克服了以往研究局限于简单模型的不足.对地震资料品质差的地区开展的实际资料联合反演,表明了方法的适用性,先验信息约束下的联合反演提高了反演精度.

关键词 [大地电磁](#) [地震](#) [联合反演](#) [模拟退火](#) [网格模型](#)

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Joint inversion of magnetotelluric and seismic data based on random resistivity and velocity distributions

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Abstract On the basis of existing research results, we develop a model construction method based on common gridded model with random resistivity and velocity distributions to meet the needs of joint inversion and the complicated model with large variations of physical properties. The forward modelings for magnetotelluric (MT) field using finite element method and the seismic travel-time computing using improved ray-tracing method, are both suitable based on this kind of unified gridded media with random resistivity and velocity distributions. Incorporating with the improved very fast simulated annealing algorithm, we fulfill the synchronous joint inversion of MT & seismic data based on this kind of common gridded model. The test of the complicated model with uneven terrain and uncommon interface and large variations of resistivity and velocity, shows the effects of joint inversion in accurately determining the resistivity and velocity structures. It improves the limitation of former studies confined in simple models of joint inversion. Moreover, the joint inversion of the observed data in an area with low-quality surveyed seismic data, proves it is practicable in improving inversion accuracy with constrained prior information.

Key words [Magnetotelluric \(MT\)](#); [Seismic](#); [Joint inversion](#); [Simulated annealing algorithm](#); [Gridded model](#).

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