

基于混沌优化算法的MUSIC脑磁图源定位方法

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如何利用实验测得的脑磁图(Magnetoencephalography; MEG)数据准确定位脑磁图源的真实活动位置是脑功能研究和临床应用中的一个关键问题。在脑磁活动源定位问题中,多信号分类(MULTiple SIGNAL Classification; MUSIC)算法是被广泛研究和采用的一类方法。为了克服MUSIC算法及其改进算法——递归多信号分类(Recursive MUSIC; R-MUSIC)算法全局扫描时速度太慢的缺点,本文提出了一种基于混沌优化算法(Chaos Optimization Algorithm; COA)的脑磁图源定位新方法。首先,结合混沌优化算法,进行初步的脑磁图源定位;然后,在小范围内结合网格的方法,进一步进行精确的脑磁图源定位。实验结果表明,此方法可实现多个脑磁图源的定位,并且速度大大加快,同时又能达到所要求的定位精度。

Music Localization for MEG Sources Based on Chaos Optimization Algorithm

How to localize the neural activation sources effectively and precisely from the magnetoencephalographic (MEG) recordings is a critical issue for the clinical neurology and the study on brain functions. Multiple Signal Classification (MUSIC) algorithm and its extension which we refer to as recursive MUSIC (R-MUSIC) algorithm are widely used to localize multiple dipolar sources from the MEG data. The shortage of MUSIC algorithm and R-MUSIC algorithm is that they run very slowly when scanning brain globally. In order to overcome this problem, a novel MEG source localization scheme based on chaos optimization algorithm is proposed in this paper. Firstly, we perform the rough MEG source localization by introducing the chaos optimization algorithm; then, combining with grids in small areas, we further perform the accurate MEG source localization. Experimental results show that this method can localize multiple dipolar sources easily. The speed of MEG source localization can be improved greatly and the accuracy of source localization is satisfactory.

关键词