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# 结合PCA和ICA的脑磁信号消噪研究

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摘要　基于二阶统计特性的主分量分解(PCA)和基于高阶统计特性的独立成分分析(ICA)是盲源分离信号处理中两种最为典型的方法．针对多通道脑磁信号的消噪问题，提出一种基于PCA与ICA相结合的信号消噪新算法．首先通过对脑磁信号进行主分量分解来降低信号维数，去掉其中包含的冗余成分，使计算时间缩短到原来的10％；进而利用自适应最大熵独立成分分析算法对降维后的数据进行二次分解，提取出脑磁信号中含有的干扰分量，使信噪比从10dB提高到80dB，达到对信号进行消噪的目的．

关键词　主分量分解　脑磁图　独立成分分析　干扰

分类号　TP302.7

# Study of removal of artifacts in MEG using PCA and ICA

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**Abstract**

Principal Component Analysis (PCA) and Independent Component Analysis (ICA) are two representative algorithms in Blind Source Separation. In this paper, a novel method for removal of artifacts in Magnetoencephalography (MEG) by combining PCA and ICA is presented. The basic concepts and algorithms of PCA and ICA are introduced firstly, MEG data are decomposed by PCA method in order to reduce the dimension of the original signals and take the redundancies out for getting the main components of data. Then the de-dimensioned data are further processed by using the adaptive Infomax algorithm of ICA. The study shows that the various artifacts can be separated from the MEG successfully and that removal of artifacts can be realized by signal reconstruction. <BR>

**Key words**　principle component analysis (PCA)　magnetoencephalography(MEG)　independent component analysis(ICA)　artifacts

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