

基于递归高通滤波的经验模态分解及其在地震信号分析中的应用

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EMD based on recursive high-pass filter and its application on

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摘要

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摘要

将地震信号分解成包含频谱互不重叠的单主周期的分量有利于地震信号的分析.分析了经验模态分解(EMD)中模态混叠的内在的解决方法,梳理了解决模态混叠的思路框架,进而提出了一种新的基于输入递归高通滤波的EMD算法.首先用递归高通号预分解成频率由高到低的多个分量,实现信号的等价带通滤波,再用EMD对各带通分量按频率高低逐级递归筛分,获得5模态分量.通过合成信号和地震信号的仿真实验表明,该算法较好地克服了模态混叠,获得了频谱互不重叠的单主周期分量.于震相分离和分析,为地震信号分析提供了一种新思路.

关键词: [经验模态分解](#) [地震信号](#) [递归高通滤波](#) [震相分析](#)

Abstract:

Decomposing seismic signal into predominant-period components without frequency spectrum mixing is seismic signal processing. The intrinsic cause of mode mixing in empirical model decomposition (EMD) traditional resolutions are studied, and the new ideas to solve the problem are analyzed, then a recursive algorithm based on the proposed recursive high-pass filter on the input signal is put forward. Firstly, the signal is decomposed by recursive high-pass filters, which are as equal band-pass filters, into several components with the frequency decreasing, and then the components are sifted recursively by EMD with the frequency high to low to obtain the complete intrinsic mode components. Experiments on artificial and natural seismic are designed for analysis and are made with a view to demonstrate the validity of the proposed method. The results of the experiments indicate that the proposed recursive high-pass filter algorithm can overcome mode mixing with the predominant-period components without frequency spectrum mixing, and is successfully separate and analyze the seismic phases. The proposed method provides a novel approach for the seismic analysis.

Keywords: [EMD](#) [Seismic signal](#) [Recursive high-pass filter](#) [Seismic phase analysis](#)

Received 2009-06-04;

Fund:

国家自然科学基金(60705001, 40974037)和中国博士后科学基金(20080430234)资助.

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