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数据库、信号与信息处理

基于小波包和改进HHT的瞬时特征分析

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摘要 希尔伯特—黄变换（HHT）目前还只能算是一种经验方法，其理论依据尚不完备，有待于进一步地完善。分析了HHT中三次样条插值法进行包络线或均值线拟合时引起的过冲和欠冲原因，提出了基于B样条曲线的分段插值算法和混合插值算法的改进HHT，解决了三次样条插值算法容易引起的过冲和欠冲现象；将改进的HHT和小波包变换（WPT）相结合，得到一种有效的瞬时特征分析方法，很好地解决HHT分析带来的模态混叠现象，减少噪声对信号的干扰，提高了信号特征提取的准确性。实验结果表明，该方法用于故障特征提取是有效的。

关键词 小波包变换 改进希尔伯特—黄变换（HHT） 分段插值 混合插值 特征提取

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Instantaneous feature analysis of non-stationary signal based on improved Hilbert-Huang Transform and wavelet packet decomposition

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Abstract

As a new theory for adaptive time-frequency analysis，the Hilbert-Huang Transform（HHT） is considered to be experiential method，it’s necessary to be consummated.When curve fitting for envelope or mean with cubic spline interpolation，it’s easily to come into contact with overshoot and undershoot problems.To solve the disfigurement，the subsection interpolation arithmetic based on B spline curve and mixed interpolation curve arithmetic are proposed.Furthermore，it’s the effective technique to avoid the aliasing phenomena.An effective analysis method for non-stationary signal based on improved HHT and the Wavelet Packets Decomposition（WPD） is presented in this paper.The proposed method can not only solve the shortcoming in HHT，but also decrease the unnecessary noise influence，and improves the veracity of the signal feature extraction.The results of experiment indicate the proposed method is effective in feature extraction.

Key words wavelet packet transform improved Hilbert-Huang Transform subsection interpolation mixed interpolation feature extraction

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