

方法技术

谐波小波滤波功效分析

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收稿日期 2006-12-19 修回日期 网络版发布日期 2009-2-16 接受日期

摘要 谐波小波在振动信号故障检测中的作用和优点已广为人知, 并已在生产和科研工作中发挥了巨大作用, 作为其重构算法的延伸——谐波小波滤波也逐渐引起人们的高度重视。在介绍谐波小波变换的基本定义及优良特性的基础上, 给出了谐波小波滤波的具体实现过程。指出谐波小波由于其频域盒形特征及复滤波结果, 故与其他二进小波变换滤波相比, 能克服滤波过程中的频泄现象, 可扩大滤波结果的应用领域。与有限脉冲响应 (FIR) 滤波进行了对应分析与对比, 发现两者的滤波效果基本相同。谐波小波同样不能克服由傅氏变换产生的频泄和栅栏效应。通过算例, 进一步验证了上述结论。

关键词 [谐波小波变换](#) [二进小波变换](#) [滤波算法](#) [FIR滤波](#) [频泄现象](#) [栅栏效应](#)

Efficacy analysis of harmonic wavelet filtering

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Abstract

The advantages of harmonic wavelet in detection of vibration malfunction have been accepted, and it has been widely used in production and scientific research. As an extension of its reconstruction algorithm, harmonic wavelet filtering has also attracted high degree of attention nowadays. In this paper, we introduced the concept of harmonic wavelet and its realizations. Compared to other binary wavelet filtering, harmonic wavelet filtering can overcome the frequency leakage during filtering because of its box shape at frequency domain and complex filtering. Harmonic wavelet filtering functions same as finite impulse response filtering, and cannot solve the frequency leakage and fence effect caused by Fourier transform. Some examples were presented in the paper.

Key words [harmonic wavelet transform](#); [binary wavelet transform](#); [filtering algorithm](#); [FIR filtering](#); [frequency leakage](#); [fence effect](#)

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DOI:

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