

论文与报告

旋转角序列小波分析快速算法

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摘要

提出了一种新型小波分析快速算法——“旋转角序列快速小波变换(RAS-FWT)”,并给出了正交小波旋转角序列的约束关系.该算法将传统的基于卷积的小波变换快速实现方法,转化为微处理器更易实现的迭代结构,并采用“循环指针”实现数字延迟,代码更加高效简洁. Mallat 算法将正交小波与N长度离散系数序列建立起了一映射关系;而RAS-FWT建立起正交小波与N/2长度离散角度序列的一映射关系,故计算量降低为Mallat算法(FWT)的一半.另外,基于“旋转角序列”的特征构造,这一技术将为正交小波构造理论开辟一条崭新的技术路线,成为这一学科的新分支.

关键词 [小波](#) [快速算法](#) [旋转角序列](#) [RAS-FWT](#) [循环指针](#)

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A Fast Wavelet Analysis Algorithm Based on Rotation Angle Series

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Abstract

A new-style fast wavelet transform, named "rotation angle series fast wavelet transform--RAS-FWT", is put forward in this paper. The restriction on the rotation angle series is also brought forward. Instead of the traditional method based on convolution, RAS-FWT adopts iteration structure that is more easily realized on microprocessors. Digital delay is implemented by "cyclic pointers". So the code will be with higher efficiency and speed. Mallat algorithm established the one-to-one mapping between orthogonal wavelets and N length discrete coefficient series, while RAS-FWT discovers the similar one-to-one mapping between orthogonal wavelets and N/2-length discrete angle series. So it has half operations less than FWT. In addition, new techniques based on the "rotation angle series" will inaugurate a brand-new approach for the wavelet construction theory, and will become a new branch of the academic subject.

Key words [Wavelet](#) [fast algorithm](#) [rotation angle series](#) [RAS-FWT](#) [cyclic pointer](#)

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