

MULTIWAVELET PREFILTERS-PART II: OPTIMAL ORTHOGONAL PREFILTERS

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Abstract

Prefiltering a given discrete signal has been shown to be an essential and necessary step in applications using unbalanced multiwavelets. In this paper, we develop 2 methods to obtain optimal 2nd-order approximation-preserving prefilters for a given orthogonal multiwavelet basis. The first prefilter optimization scheme exploits the Taylor series expansion of the prefilter combined with the multiwavelet. The second one is achieved by minimizing the energy compaction ratio of the wavelet coefficients for an experimentally determined average input spectrum. We use both methods to find prefilters for the cases of the DGHM and Chui-Lian multiwavelets. We then compare experimental results using these filters in an image compression scheme. Additionally, using the DGHM multiwavelet with the optimal prefilters from the first scheme, we find that quadratic input signals are annihilated by the high-pass portion of filter bank at the first level of decomposition.

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