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Alexander Petukhov* (petukhov@math.uga.edu), Department of Mathematics, University of Georgia, Athens, GA 30602. *Method of Virtual components for wavelet frames*. Preliminary report.

The redundancy of frame systems results in non-uniqueness of decompositions. This fact can be used for constructing expansions with desirable properties (for instance, sparse decompositions).

Finding the sparsest representations for individual vectors is an NP-hard non-linear problem. Whereas linear algorithms for implementation of some properties for linear subspaces (functional classes) are studied much better. A number of their vanishing moments providing sparse representations for smooth functions is one of those properties for wavelet frames.

Unfortunately, for wavelet frames this problem is not as straightforward as for wavelet bases. We are going to show how, having a wavelet frame whose scaling function has a given reproduction order for polynomials, to obtain a dual wavelet frame operator with the same (i.e., maximum) order of vanishing moments.

The relation of this method with non-linear problems of Information Theory also will be discussed. (Received May 03, 2007)