Long, Ruilin; **Chen, Wen**

Wavelet basis packets and wavelet frame packets. (English) Zbl 0882.42022

J. Fourier Anal. Appl. 3, No. 3, 239-256 (1997).

The article generalizes the results of *Z. Shen* [SIAM J. Math. Anal. 26, No. 4, 1061-1074 (1995; Zbl 0826.42025)] on wavelet packets in $\mathbb{R}^d$ and succeeds to set up a more natural framework. In particular, the following result is proved:

Let $\varphi \in L^2(\mathbb{R}^d)$ be an orthogonal scaling function with two-scale symbol $m_0(\xi)$ and suppose that there exists a $2\pi\mathbb{Z}^d$-periodic measurable matrix completion $M(\xi) = (m_\mu(\xi+\nu\pi))_{\mu,\nu\in E_d}$ being unitary for ξ a.e.. Further, let $(n, j) \in \mathbb{Z}_+ \times \mathbb{Z}_+$ correspond to the dyadic interval $I_{j,n} = \{l \in \mathbb{Z}_+ : 2^{jd}n \le l < 2^{jd}(n+1)\}$. Then $\{2^{jd/2}w_n(2^j x - k)\}$, $k \in \mathbb{Z}^d$, is an orthonormal basis of $L^2(\mathbb{R}^d)$ if and only if $\{I_{j,n}\}_{(n,j)}$ is a disjoint covering of $\mathbb{Z}_+$.

Finally, an "unstability" result of nonorthogonal wavelet packets in *A. Cohen* and *I. Daubechies* [SIAM J. Math. Anal. 24, No. 5, 1340-1354 (1993; Zbl 0792.42020)] is generalized to $\mathbb{R}^d$.

Reviewer: G.Plonka (Rostock)

MSC:

42C40 Nontrigonometric harmonic analysis involving wavelets and other special systems

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