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Wavelet Sets for Shifts by Wallpaper Symmetries

The wallpaper groups are the symmetry groups of two dimensional crystals. If Γ is a wallpaper group and A is a 2×2 dilation matrix compatible with Γ , there is a concept of an $A\Gamma$ -wavelet, which is a function $\psi \in L^2(\mathbb{R}^2)$ for which the set of shifts by members of Γ and dilations by integer powers of A is an orthonormal basis of $L^2(\mathbb{R}^2)$. An $A\Gamma$ -wavelet set, is a Borel subset Ω of \mathbb{R}^2 such that the characteristic function of Ω is the Fourier transform of an $A\Gamma$ -wavelet. We will report on the search for simple $A\Gamma$ -wavelet sets. (This is joint work with Larry Baggett, Alex Christie, Kathy Merrill, and Judy Packer.)