998-42-39 **Akram Aldroubi** (akram.aldroubi@vanderbilt.edu), Dept. of Mathematics, 1326 Stevenson Center, Nashville, TN 37240, **Carlos Cabrelli*** (cabrelli@dm.uba.ar), Dept. of Mathematics, Pab. I Ciudad Universitaria, 1428 Buenos Aires, Argentina, and **Ursula Molter** (umolter@dm.uba.ar), Dept of Mathematics, Pab. I Ciudad Universitaria, 1428 Buenos Aires, Argentina. *Designing Irregular Wavelet Frames.*

We prove the existence of systems of smooth time-frequency atoms on irregular grids that form frames for $L^2(\mathbf{R}^d)$. Our results in particular show the existence of wavelet frames in $\mathbf{R}^d$, and provide construction methods for such wavelets. We also show how the method allows the construction of non-harmonic Gabor transforms on arbitrary grids. Possible applications include image and video compression, speech coding, image and digital data transmission,image analysis, estimations and detection, and seismology. We consider families of functions $\{g_l\}_{l\in L} \subset L^2(\mathbf{R}^d)$ and discrete sets $X = \{x_{k,l} : l \in L, k \in K\} \subseteq \mathbf{R}^d$ such that the collection

$$\{g_l(x - x_{k,l})\ l \in L,\ k \in K\}$$

form a frame for $L^2(\mathbf{R}^d)$.

We provide examples of different wavelet type decompositions of the form

$$|A_j|^{1/2}\psi(A_j(x - x_{k,j})),$$

where $\{A_j\}$ are arbitrary invertible matrices and $X_j = \{x_{k,j}\}_k$ are different grids for each j. These constructions produce examples of irregular wavelet frames in $\mathbf{R}^d$ with different special properties. Our method allows the construction of very general systems and in particular include many of the unifying systems that recently have appeared in the literature.

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