On the Wavelets Having Gevrey Regularities and Subexponential Decays

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An MRA wavelet ψ is determined by a scaling function φ as

$$\hat{\psi}(\xi) = e^{i\xi/2}\overline{m\left(\frac{\xi}{2}+\pi\right)}\hat{\varphi}\left(\frac{\xi}{2}\right).$$

Meyer found orthonormal wavelets having polynomial decays or especially subexponential decays. The subexponential decay implies the degeneracy of the order of Gevrey type and the regularity of $\hat{\varphi}(\xi)$ comes from just the regularity of the low-pass filter $m(\xi)$.

In general, it would be difficult to control the decay rate of $\hat{\varphi}$ in frequency (regularity in time).

	A_x	G_x^s	C_x^r
A_ξ	nonexistence	nonexistence	Battle-Lemarié, Daubechies
G_ξ^s	Meyer		Hernández-Wang-Weiss

We shall construct orthonormal wavelets which fill in the blank of the above table, i.e., new wavelets having Gevrey regularities both in time and frequency.

References

[1] *Jacek Dziban̂ski; Eugenio Hernàndez. Band-Limited Wavelets with Subexponential Decay.* Canad. Math. Bull. Vol. 41, No. 4, 398-403 (1998).

[2] *Eugenio Hernàndez; Xihua Wang; Guido Weiss. Smoothing Minimally Supported Frequency Wavelets: Part II.* The Journal of Fourier Analysis and Applications, Vol. 1, No. 1, 23-41 (1997).