The Path-Connectivity of MRA Wavelets in $L^2(\mathbb{R}^d)$

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Preprint no. 2008-07
June 5, 2008

Abstract

We show that for any $d \times d$ expansive matrix A with integer entries and $|\det(A)| = 2$, the set of all A-dilation MRA wavelets is path-connected under the $L^2(\mathbb{R}^d)$ norm topology. We do this through the application of A-dilation wavelet multipliers, namely measurable functions f with the property that the inverse Fourier transform of $(f\widehat{\psi})$ is an A-dilation wavelet for any A-dilation wavelet ψ (where $\widehat{\psi}$ is the Fourier transform of ψ). In this process we have completely characterized all A-dilation wavelet multipliers for any integral expansive matrix A with $|\det(A)| = 2$.

2000 AMS Subject Classification: Primary: 42-XX, 46-XX

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