Abstract

Let $A$ be any $2 \times 2$ real expansive matrix. For any $A$-dilation wavelet $\psi$, let $\hat{\psi}$ be its Fourier transform. A measurable function $f$ is called an $A$-dilation wavelet multiplier if the inverse Fourier transform of $(f \hat{\psi})$ is an $A$-dilation wavelet for any $A$-dilation wavelet $\psi$. In this paper, we give a complete characterization of all $A$-dilation wavelet multipliers under the condition that $A$ is a $2 \times 2$ matrix with integer entries and $|\det(A)| = 2$. Using this result, we are able to characterize the phases of $A$-dilation wavelets and prove that the set of all $A$-dilation MRA wavelets is path-connected under the $L^2(\mathbb{R}^2)$ norm topology for any such matrix $A$. 

Department of Mathematics and Statistics, UNC-Charlotte, Charlotte, NC 28223-0001