1023-42-885 **Simon K. Alexander**, **Shikha Baid**, **Saurabh Jain**, **Juan R. Romero** and **Manos Papadakis*** (mpapadak@math.uh.edu), University of Houston, Department of Mathematics, 651 PGH, Houston, TX 77204-3008. *Isotropic Multiresolution Analysis.*

Our work addresses the construction of refinable, isotropic functions and wavelets arising from such functions in $L^2(\mathbb{R}^d)$ with $d > 1$. The multiresolution analyses produced by such refinable functions are referred to as Isotropic. The essential support of the Fourier transform of refinable isotropic functions is contained in the ball of radius $2/3$ centered at the origin. Consequently, there are no compactly supported (in the space domain) isotropic refinable functions. We provide examples of isotropic refinable functions and their associated isotropic wavelets when the Fourier transform of these functions has essential support contained in $B(0, r)$ with $r < 1/2$. These MRAs give rise to a new class of fast wavelet algorithms which can proces multidimensional data sets in their original dimensionality. For the case $1/2 < r \leq 2/3$ these constructions require more than one refinable isotropic function. Finally, we provide empirical evidence to show that the fast wavelet algorithms based on the proposed Isotropic MRAs have superior performance for multidimensional texture segmentation when compared with the standard tensor product wavelet algorithms. We also present results of an application of texture-based soft tissue identification in cardiovascular imaging. (Received September 26, 2006)