998-42-47 **Kanghui Guo** (kag026f@smsu.edu), Department of Mathematics, Southwest Missouri State University, Springfield, MO 65804-0094, **Demetrio Labate** (dlabate@unity.ncsu.edu), Department of Mathematics, North Carolina State University, Raleigh, NC 27695-8205, **Wang-Q Lim** (WangQ@math.wustl.edu), Department of Mathematics, Campus Box 1146, Washington Univ., One Brookings Drive, St. Louis, MO 63130-4899, **Guido L. Weiss** (guido@math.wustl.edu), Department of Mathematics, Campus Box 1146, Washington Univ., One Brookings Drive, St. Louis, MO 63130-4899, and **Edward N. Wilson*** (enwilson@math.wustl.edu), Department of Mathematics, Campus Box 1146, Washington Univ., One Brookings Drive, St. Louis, MO 63130-4899. *Wavelets with composite dilations.*

A wavelet with composite dilations is a function generating a Parseval frame for $L^2(R^n)$ under the action of lattice translations and dilations by products of elements drawn from non-commuting matrix sets A and B. Typically, the members of B are shear matrices (all eigenvalues are one) while the members of A are matrices expanding or contracting on a proper subspace of R^n. These wavelets are of interest in applications because of their tendency to produce "long, narrow" windows well suited to edge detection. Examples of such systems bearing the names "brushlets" and "contourlets" have been considered by Donoho and Candes, Vetterli and Do, and others. In this paper, we discuss the remarkable extent to which the theory of wavelets with composite dilations parallels the theory of wavelets employing dilations by powers of a single expanding matrix. Thus, even though the dilation set AB contains no expanding matrix, there exist orthonormal MSF wavelets, orthonormal wavelet systems of MRA type with the number of generators specified by the structure of AB, Parseval frame MRA wavelets with a single generator, and wavelets well localized in time and frequency. (Received January 05, 2004)