1030-42-183 **Edward N. Wilson*** (enwilson@math.wustl.edu), Department of Mathematics, Campus Box 1146, Washington University, One Brookings Drive, St. Louis, MO 63130, and **Damir Bakic**.
Orthonormal Wavelets with Integer Matrix Dilations. Preliminary report.

In this paper, we present some new twists on a familiar topic, namely orthonormal wavelet systems in n dimensions arising from a single generator via lattice translations and an expanding, integer dilation matrix A whose determinant has magnitude larger than 2. We modify the usual MRA condition by considering orthornormal wavelets for which there is a scaling function whose lattice translations constitute a Parseval frame for the wavelet's scaling (or core) space. In particular, with B the transpose of A, this phenomenon arises for an MSF wavelet determined by an A-wavelet set which is the complement of S in BS and S is contained in a lattice tiling domain. We first characterize the family of all such sets S by structural properties, then present an explicit algorithm for construction of a typical member of the family. This algorithm is a special case of the general algorithm for wavelet sets given by Baggett, Medina, and Merrill. In one dimension, Dai and Larson constructed a family of such sets involving two disjoint intervals; we generalize this to two dimensions with dilations by powers of the quincunx matrix. We conclude with some preliminary results on generation of non-MSF orthonormal wavelets with singly generated scaling spaces. (Received August 01, 2007)