Meeting: 1004, Bowling Green, Kentucky, SS 5A, Special Session on Advances in the Study of Wavelets and Multiwavelets

1004-47-6 **Dorin Ervin Dutkay** and **Palle E. T. Jorgensen*** (jorgen@math.uiowa.edu), Department of Mathematics, MLH 14, The University of Iowa, Iowa City, IA 52242. *Some wavelet constructions in nonlinear dynamics.*

The words 'nonlinear' and 'wavelets' in the title beg two questions: the Hilbert space, and the translation? Answers: arXiv:math.CA/0407517, and a paper in Rev. Mat. Iberoamericana. Examples: The state space X for a subshift system in symbolic dynamics, and the complex iteration systems which generate Julia sets X. The first step in getting a Hilbert space is a covariant measure on X, and the second step is a certain lifting from X to a space $P(X)$ of discrete paths which originate in X. On X, we have a Perron-Frobenius-Ruelle operator. We give up the analogue of translations, but work instead with the operator of multiplication by the variable z restricted to X. Our Hilbert space will be built on martingales on $P(X)$, and the unitary operator U which corresponds to scaling for familiar wavelets will simply be the substitution of our system. U will scale between levels of our discrete L^2-martingales, and generalized multiresolutions, or multiwavelets. We prove a generalization of Baggett-Merrill's dimension consistency formula, and a dichotomy: Our low/high-pass conditions will refer to either a finite set of points or to a singular measure with full support. For the middle-third Cantor set, this measure will be a classical infinite-product Riesz measure. (Received October 26, 2004)