1001-46-5 **Palle E. T. Jorgensen*** (jorgen@math.uiowa.edu), Dept Mathematics, MLH, University of Iowa, Iowa City, IA 52242. *Variable coefficient Iterated Function Systems associated with multiresolution analysis.*

While multiresolution analysis is widely used in wavelet constructions, as a tool it is in fact much more versatile. For dyadic wavelets, the corresponding Iterated Function Systems(IFS) are familiar as regards to geometry; but the corresponding harmonic analysis is still at an early stage as far as basic theorems are concerned. In this talk, we shall focus on several variables, and on general matrix scaling. One reason the use IFSs in wavelet analysis requires new tools and techniques is that Hutchinson's theorem, when specialized to the wavelet setting, applies directly only to the case of the (generalized) Haar wavelet. Taking as our starting point the cascade approximation to the generalized multiresolution scaling function, and an associated Ruelle-Perron-Frobenius operator, we present a new IFS-tool, which may be viewed as a variable coefficient version of Hutchinson's theorem. It applies equally well to the familiar Hilbert space $L^2(R^d)$ of wavelet analysis, as to a class of new Hilbert spaces built directly from the fractals at hand, i.e., built directly from the IFSs. We report on joint research with Dorin Dutkay (papers posted on the arXiv) where we we prove, among other things, a new dichotomy theorem for the IFS-cascade approximation operator. (Received January 08, 2004)