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Co-authors Dorin Dutkay, Keri Kornelson, Karen Shuman: An orthogonal harmonic analysis of selfsimilar measures. Our analysis involves dynamical systems and Cuntz algebras which in turn determine both the algorithmic and the analytic part of the problem. It divides up into two parts, periodic and non-periodic. The precise meaning involves a random walk-dynamical system. The periodic case is especially easy to understand in terms of a natural encoding with finite and infinite code-words. By contrast, the second case involves an intriguing family of invariant sets. They can have quite subtle fractal properties.

Cuntz algebras are infinite algebras on a finite number of generators, and on certain relations. By their nature, they are selfsimilar and they therefore ideally serve to encode iterated function systems (IFSs) and their measures. At the same time, their representations offer (in a more subtle way) a new harmonic analysis of IFS-fractal measures. Even though the Cuntz algebras initially entered into the study of operator-algebras and physics, in recent years these same Cuntz algebras, and their representation, have found increasing use in pure and applied problems, wavelets, fractals, signals. (Received January 23, 2010)