1120-43-213 **Calvin F. Hotchkiss*** (hotchkis@iastate.edu) and **Eric S. Weber**. *A fast Fourier transform for fractal approximations.*

We consider finite approximations of a fractal generated by an iterated function system of affine transformations on $\mathbb{R}^d$ as a discrete set of data points. Considering a signal supported on this finite approximation, we propose a Fast (Fractal) Fourier Transform by choosing appropriately a second iterated function system to generate a set of frequencies for a collection of exponential functions supported on this finite approximation. Since both the data points of the fractal approximation and the frequencies of the exponential functions are generated by iterated function systems, the matrix representing the Discrete Fourier Transform (DFT) satisfies certain recursion relations, which we describe in terms of Diţă's construction for large Hadamard matrices. These recursion relations allow for the DFT matrix calculation to be reduced in complexity to $O(n \log n)$, as in the case of the classical FFT. (Received February 22, 2016)