

# Wavelets and fractals

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007 Kemeny Hall, 4:00 pm  
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## Abstract

We show how some ideas from wavelet theory can be applied to discrete dynamical systems and fractals using operator algebra techniques. The common property of these concepts is the self-similarity: a dilation of the scaling function or the fractal is a sum of copies of the scaling function or fractal itself. In wavelet theory one looks for functions that have orthogonal translates. Transferring this into the fractal realm, we obtain Fourier bases for fractal measures! Thus we can construct orthogonal Fourier bases on some affine fractals (such as some special Cantor sets or Sierpinski gaskets) that satisfy a combinatorial condition. This involves a detailed spectral analysis of Ruelle's transfer operator, a key tool in the theory of discrete dynamical systems.