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Analysis on Fractals

Fractals are sets or measures which look similar at all scales. Simple examples are the Cantor set, the Sierpinski gasket and the Koch curve. Such objects typically have fractional dimension. There are now many applications of fractals to physical phenomena, in particular to the study of “irregular” media.

Stages in the project:

- Background material: Parts of a 1981 paper of mine in the Indiana Journal, of some subsequent surveys, and of the books by Barnsley and Falconer on fractals
- In studying heat diffusion, electrostatic charge distribution, wave propagation etc. on fractal materials it is necessary to have an appropriate notion of (Dirichlet) energy. This has been studied recently by Mosco, and part of the project will consist of studying those papers, of which I have copies.
- There are many other questions concerning differential equations, and extensions of various notions from analysis such as Poincare and Sobolev inequalities, to fractal objects.