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A Fibonacci-Fractal: a Bicolored Self-Similar Multifractal

Wolfdieter L a n g *

Institut für Theoretische Physik
Universität Karlsruhe
Kaiserstrasse 12, D-76128 Karlsruhe
Germany

ABSTRACT

An example of a self-similar fractal based on the Fibonacci substitution rule $1 \to 10$, $0 \to 1$, starting with 1, is analyzed. The inverse of the function $\tau(q) = (q-1)D_q$, with the generalized dimensions D_q can be computed analytically. A parametric equation for the singularity spectrum function $f(\alpha)$, the Legendre transform of $-\tau(q)$, is also given exactly.

Besides uniform and nonuniform Cantor sets this example (and obvious generalizations thereof) can be used as further touchstone for approximation methods.

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* E-mail address: wolfdieter.lang@phys.uni-karlsruhe.de