About the Multifractal Geometry of the Fat Baker's Transformation

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Abstract

We will present an analogue of the fat baker's transformation introduced by J. Alexander and J. York (1984): it is defined as an iterated function system $\mathcal{S}_\beta$ (where $1 < \beta < 2$ is a parameter) consisting of two affine transformations mapping the unit square into itself. The invariant set K_β is a self-affine set and the transformation T_β induced by $\mathcal{S}_\beta$ on K_β is a non-Axiom A dynamics conjugate to a full-shift on two symbols. The interesting point here, is that geometric properties (Hausdorff dimension and multifractal structure) of the *natural* dynamical measure on K_β (say, the SRB-measure), are closely related to arithmetic properties of β. These artifacts, which are far from being completely understood, are concerned with the classic problem of the singularity of the infinite convolved Bernoulli measures studied in the last 30's, in particular by B. Jensen and A. Winter (1935) and P. Erdös (1939).