

The dimension theory of some families of non-conformal iterated function systems

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Abstract

One of the main goals of fractal geometry is to give formulas for the dimension of self-similar and self-affine sets. There are many results in this topic, most of them revolve around iterated function systems on \mathbb{R}^d consisting of conformal maps. In the first half of my thesis I will introduce a specific family of non-conformal systems on the line, investigate its behavior, and give a formula for the Hausdorff dimension of these systems.

Afterwards we turn our attention toward a really important notion that can be useful if one want to deal with self-affine IFS, namely the Furstenberg measure. First we only give a vague picture, and then show how it works in certain examples to make the understanding easier. We will present some of the most important tools which have been introduced recently to study the theory of self-affine fractals. Finally we show the connection between the Lyapunov exponents of an IFS and the associated Furstenberg measure in a special case.