

Abstract

SELF-SIMILAR SETS AND MEASURES

AUTHOR

Szvák Edina
BSc student

SUPERVISOR

Károly Simon
Professor and Head of Department,
BME, Department of Stochastics

In this thesis we consider Iterated Function Systems (IFS) which are either self-similar or hyperbolic. The hyperbolic IFS' are generalizations of the self-similar ones.

We focus on the case when the cylinders have significant overlap. To handle the problem caused by the overlapping we study a method which is called "transversality method". We want to estimate the dimension of the attractor of a typical self-similar (or in the one-but last chapter) hyperbolic IFS. Furthermore, we also want to know if the Lebesgue measure of a self-similar attractor is positive assuming that the so-called similarity dimension is greater than one. We ask the corresponding questions for the the self-similar invariant measures.

Due to the limitation of the transversality method, we cannot answer these questions for individual IFS'. We always consider families of self-similar or hyperbolic IFS' and ask these questions above for a typical element of the family. Essentially the transversality method yields (when we can apply it) that the behavior of the typical element of a family of self-similar IFS is the one that we would expect. Using this we describe the solution of the absolute continuity of the infinite Bernoulli convolution measures.

In Chapter 7 we study hyperbolic IFS. The most important tool is the so-called topological pressure. The root of the so-called pressure formula is analogous to the similarity dimension. We verify that whenever the transversality condition holds, the Hausdorff dimension of the attractor of a typical element of a given family of hyperbolic IFS' can be computed as the root of the pressure formula.