Title: Hausdorff metric and its application in fractals

Author: Branislav Ján Rohál'

Department: Department of Mathematical Analysis

Supervisor: prof. RNDr. Miroslav Hušek, DrSc.,
Department of Mathematical Analysis

Abstract: In this thesis we focus on the themes naturally connected with the concept of a fractal. In the first part of the thesis we pay attention to Banach fixed point theorem and to the Hausdorff metric which are later used when studying self-similar sets. There are included parts on the Hausdorff, similarity, and box-counting dimension, too. In the second part of the thesis the new approaches to fractal dimension and some their properties are refered. We introduce generalization of this concept for any space admitting a fractal structure and for a distance space where also the "size" of sets on each level of fractal structure is considered. In the last chapter the contribution of new approache is demonstrated, — this enables defining the notion needed and counting fractal dimension where it was not possible under the classical approaches, too. Application to the domain of words and counting of dimensions of a language generated by a regular expresion are presented.

Keywords: Hausdorff metric, Banach fixed point theorem, self-similar set, Hausdorff dimension, fractal dimension