

The project will study parametric families of planar attractors. One such family are the attractors of the so-called Henon family, which has been studied since 1976, in connection with a system of differential equations modeling atmospheric convection, introduced by Edward Lorenz. These objects in the theory of dynamical systems serve as a fundamental example of a set of chaotic solutions of a deterministic, yet unpredictable system. Another such family to be studied will be associated with the so-called Arnold Standard Family of continuous transformations of the circle. The family was introduced as a simplified model for driven mechanical rotors and provides also simple models of certain phenomena in electronics, of coupled musical instruments, as well as cardiac tissue. The project will study bifurcation (transition from simple to complex state) of these objects as parameter varies, from the point of view of their geometry (topology) and chaoticity of dynamics. The study will employ the approach of inverse limits, that allow the study of complicated objects, such as fractal-like chaotic attractors, in terms of simple objects, such as topological graphs or dendrites, and their continuous transformations.