

Zeta functions and complex dimensions of orbits of dynamical systems

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Abstract: The standard zeta function can be generalized to a zeta function of the so-called fractal string. Various (almost equivalent) definitions of zeta functions of a general bounded set that generalize this definition have been introduced by Lapidus. It was shown that the poles and their principal parts of the meromorphic extension, if it exists, of a zeta function of a set reveal the intrinsic geometry of the set. In particular, the set is considered fractal if there are non-real complex dimensions.

We prove the existence of the meromorphic extensions of fractal zeta functions of orbits of dynamical systems generated by parabolic germs of analytic diffeomorphisms on the real line and describe their complex dimensions. We relate them to some intrinsic properties of the generating function and to the geometry of its orbits.

This is a joint work with G. Radunovic, University of Zagreb, and P. Mardesic, University of Burgundy.