A survey of Fractal Zeta Functions and Fractal drums

Goran Radunović
University of Zagreb Faculty of Electrical Engineering and Computing

In this talk we will present a survey of the main topics and results from the recently published research monograph "Fractal Zeta Functions and Fractal Drums: Higher-Dimensional Theory of Complex Dimensions" by the coauthors Michel L. Lapidus, Goran Radunović and Darko Žubrinić. In the monograph, a new theory of fractal zeta functions and complex dimensions valid for arbitrary subsets of Euclidean spaces has been developed. This theory provides a significant extension of the existing theory of zeta functions for fractal strings, i.e., "fractal" subsets of the real line. Two new classes of fractal zeta functions, namely, the distance and the tube zeta function, are introduced and their properties are investigated. In fact, for a given subset, its complex dimensions are defined as poles or even more general singularities of the corresponding fractal zeta function. The complex dimensions themselves, although defined analytically, have a deep connection with the fractal geometry of the given set.