Mathematics Colloquium

Geometric oscillations and the lattice/nonlattice dichotomy

John A. Rock
Cal Poly Pomona

Friday, May 4, 2018
11:10 a.m.-12 p.m.
Building 53 Room 213

Abstract

The mathematical phenomenon of "geometric oscillations" exhibited by fractal sets in Euclidean space can be studied in great detail through the complex dimensions associated with various notions of fractal zeta functions, an approach developed by Lapidus and collaborators. This talk features a survey of some these fractal zeta functions (namely the geometric, box-counting, distance/tube, and scaling zeta functions) with an emphasis on the structure of complex dimensions in the self-similar case. Moreover, the lattice/nonlattice dichotomy of self-similar sets and its ramifications in the context of such geometric oscillations is explored, with special attention paid to the (visual) information provided by simultaneous Diophantine approximation.

About the speaker : Dr. John A. Rock is an Associate Professor and the Graduate Coordinator in the Department of Mathematics and Statistics at Cal Poly Pomona. Dr. Rock obtained his PhD from UC Riverside in 2007. His thesis *Complex Dimensions of Fractal Strings and Multifractal Analysis of Mass Distributions* was developed under the guidance of his advisor Dr. Michel L. Lapidus. His research typically focuses on the development of a theory of complex dimensions for fractals in Euclidean space via so-called fractal zeta functions. Dr. Rock strives to get students involved in his research endeavors, but lately he has become more involved in broadening participation in mathematics across the country with an emphasis on students in the CSU system. Also, he has a pet project dealing with a version of the tabular method for integration by parts, called RIP for 'row integration by parts', and creating a set of corresponding YouTube videos.