Fractal Geometry, Complex Dimensions And Zeta Functions

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Number theory, spectral geometry, and fractal geometry are interlinked in this in-depth study of the vibrations of fractal strings, that is, one-dimensional drums with fractal boundary.Key Features of this Second Edition:The Riemann hypothesis is given a natural geometric reformulation in the context of vibrating fractal stringsComplex dimensions of a fractal string, defined as the poles of an associated zeta function, are studied in detail, then used to understand the oscillations intrinsic to the corresponding fractal geometries and frequency spectraExplicit formulas are extended to apply to the geometric, spectral, and dynamical zeta functions associated with a fractalExamples of such explicit formulas include a Prime Orbit Theorem with error term for self-similar flows, and a geometric tube formulaThe method of Diophantine approximation is used to study self-similar strings and flows Analytical and geometric methods are used to obtain new results about the vertical distribution of zeros of number-theoretic and other zeta functionsThroughout, new results are examined and anew definition of fractality as the presence of nonreal complex dimensions with positive real parts is presented. Thenewfinal chapterdiscusses several new topics and results obtained since the publication of the first edition.The significant studies and problems illuminated in this work may be used in a classroom setting at the graduate level. Fractal Geometry, Complex Dimensions and Zeta Functions, Second Editionwill appeal to students and researchers in number theory, fractal geometry, dynamical systems, spectral geometry, and mathematical physics. EAN/ISBN : 9781461421764 Publisher(s): Springer, Berlin, Springer, New York Format: ePub/PDF Author(s): Lapidus, Michel L. - van Frankenhuijsen, Machiel

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