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Título:

Autor:

Precio: \$1480.18

Editorial:

Año: 2013

Tema:

Edición: 2ª

Sinopsis

ISBN: 9781461421757

The Riemann hypothesis is given a natural geometric reformulation in the context of vibrating fractal strings

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

Numerous theorems, examples, remarks and illustrations enrich the text

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. This second edition of Fractal Geometry, Complex Dimensions and Zeta Functions will appeal to students and researchers in number theory, fractal geometry, dynamical systems, spectral geometry, complex analysis, distribution theory, and mathematical physics. The significant studies and problems illuminated in this work may be used in a classroom setting at the graduate level.

Key Features include:

- The Riemann hypothesis is given a natural geometric reformulation in the context of vibrating fractal strings
- Complex dimensions of a fractal string are studied in detail, and used to understand the oscillations intrinsic to the corresponding fractal geometries and frequency spectra
- Explicit formulas are extended to apply to the geometric, spectral, and dynamical zeta functions associated with a fractal
- Examples of such explicit formulas include a Prime Orbit Theorem with error term for self-similar flows, and a geometric tube formula
- The method of Diophantine approximation is used to study self-similar strings and flows

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· Analytical and geometric methods are used to obtain new results about the vertical distribution of zeros of number-theoretic and other zeta functions

The unique viewpoint of this book culminates in the definition of fractality as the presence of nonreal complex dimensions. The final chapter (13) is new to the second edition and discusses several new topics, results obtained since the publication of the first edition, and suggestions for future developments in the field.

Review of the First Edition:

" The book is self contained, the material organized in chapters preceded by an introduction and finally there are some interesting applications of the theory presented. ...The book is very well written and organized and the subject is very interesting and actually has many applications."

_Nicolae-Adrian Secolean, Zentralblatt

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Content Level » Research

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Keywords » Riemann hypothesis - cantor strings - complex dimensions - fractality - inverse spectral problems - minkowski measurability - nonlattice self-similar strings - self-similar flows - tubular neighborhoods

Related subjects » Analysis - Dynamical Systems & Differential Equations - Number Theory and Discrete Mathematics

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