



Differential Equations on Fractals: A Tutorial

Robert S. Strichartz

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Differential Equations on Fractals opens the door to understanding the recently developed area of analysis on fractals, focusing on the construction of a Laplacian on the Sierpinski gasket and related fractals. Written in a lively and informal style, with lots of intriguing exercises on all levels of difficulty, the book is accessible to advanced undergraduates, graduate students, and mathematicians who seek an understanding of analysis on fractals. Robert Strichartz takes the reader to the frontiers of research, starting with carefully motivated examples and constructions.

One of the great accomplishments of geometric analysis in the nineteenth and twentieth centuries was the development of the theory of Laplacians on smooth manifolds. But what happens when the underlying space is rough? Fractals provide models of rough spaces that nevertheless have a strong structure, specifically self-similarity. Exploiting this structure, researchers in probability theory in the 1980s were able to prove the existence of Brownian motion, and therefore of a Laplacian, on certain fractals. An explicit analytic construction was provided in 1989 by Jun Kigami. *Differential Equations on Fractals* explains Kigami's construction, shows why it is natural and important, and unfolds many of the interesting consequences that have recently been discovered.

This book can be used as a self-study guide for students interested in fractal analysis, or as a textbook for a special topics course.

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