Contents

Preface		13
Preface	to the English Translation	x
Chapte	r 1. The Fundamentals of Fractals	1
1.1.	What is the dimension?	1
1.2.	Hausdorff measure and Hausdorff dimension	4
1.3.	Examples of fractals and their Hausdorff dimensions	7
1.4.	Nowhere-differentiable functions	11
Exe	rcises	14
Chapte	r 2. Self-Similar Sets	17
2.1.	Existence and uniqueness	17
2.2.	The size and shape of a self-similar set	20
2.3.	Self-affine sets	26
2.4.	Fractals and chaos	29
Exe	rcises	30
Chapte	r 3. An Alternative Computation for Differentiation	33
3.1.	A chaotic dynamical system and its generating function	33
3.2.	The Schauder expansion	36
3.3.	The de Rham equations and Lebesgue's singular function	38
3.4.	The system of difference equations of Lebesgue's function	41
3.5.	The relation between $T(x)$ and $M_{\alpha}(x)$ and its generalization	44
3.6.	Wavelet expansions	47
Exe	rcises	51
Chapte	er 4. In Quest of Fractal Analysis	53
4.1.	The Sierpiński gasket	53
4.2.	The wave equation on the Sierpiński gasket.	
	A physical observation	59
4.3.	The Laplacian on the Sierpiński gasket	
	and a Gauss-Green type theorem	63
4.4.	The Dirichlet problem for Poisson's equation	68
Exe	rcises	72
Recommended Reading		75
Index		77