

1. Record Nr.	UNINA9910829972703321
Titolo	Scaling, fractals and wavelets [[electronic resource] /] / edited by Patrice Abry, Paulo Goncalves, Jacques Levy Vehel
Pubbl/distr/stampa	London, : ISTE Hoboken, NJ, : Wiley, 2009
ISBN	1-282-16536-4 9786612165368 0-470-61156-1 0-470-39422-6
Descrizione fisica	1 online resource (506 p.)
Collana	ISTE ; ; v.74
Altri autori (Persone)	AbryPatrice GoncalvesPaulo <1967-> Levy VehelJacques <1960->
Disciplina	621.382/20151 621.38220151
Soggetti	Signal processing - Mathematics Fractals Wavelets (Mathematics)
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Scaling, Fractals and Wavelets; Table of Contents; Preface; Chapter 1. Fractal and Multifractal Analysis in Signal Processing; 1.1. Introduction; 1.2. Dimensions of sets; 1.2.1. Minkowski-Bouligand dimension; 1.2.2. Packing dimension; 1.2.3. Covering dimension; 1.2.4. Methods for calculating dimensions; 1.3. Holder exponents; 1.3.1. Holder exponents related to a measure; 1.3.2. Theorems on set dimensions; 1.3.3. Holder exponent related to a function; 1.3.4. Signal dimension theorem; 1.3.5. 2-microlocal analysis; 1.3.6. An example: analysis of stock market price; 1.4. Multifractal analysis 1.4.1. What is the purpose of multifractal analysis?1.4.2. First ingredient: local regularity measures; 1.4.3. Second ingredient: the size of point sets of the same regularity; 1.4.4. Practical calculation of spectra; 1.4.5. Refinements: analysis of the sequence of capacities, mutual analysis and multisingularity; 1.4.6. The multifractal spectra of

certain simple signals; 1.4.7. Two applications; 1.4.7.1. Image segmentation; 1.4.7.2. Analysis of TCP traffic; 1.5. Bibliography; Chapter 2. Scale Invariance and Wavelets; 2.1. Introduction; 2.2. Models for scale invariance; 2.2.1. Intuition  
2.2.2. Self-similarity  
2.2.3. Long-range dependence; 2.2.4. Local regularity; 2.2.5. Fractional Brownian motion: paradigm of scale invariance; 2.2.6. Beyond the paradigm of scale invariance; 2.3. Wavelet transform; 2.3.1. Continuous wavelet transform; 2.3.2. Discrete wavelet transform; 2.4. Wavelet analysis of scale invariant processes; 2.4.1. Self-similarity; 2.4.2. Long-range dependence; 2.4.3. Local regularity; 2.4.4. Beyond second order; 2.5. Implementation: analysis, detection and estimation; 2.5.1. Estimation of the parameters of scale invariance  
2.5.2. Emphasis on scaling laws and determination of the scaling range  
2.5.3. Robustness of the wavelet approach; 2.6. Conclusion; 2.7. Bibliography; Chapter 3. Wavelet Methods for Multifractal Analysis of Functions; 3.1. Introduction; 3.2. General points regarding multifractal functions; 3.2.1. Important definitions; 3.2.2. Wavelets and pointwise regularity; 3.2.3. Local oscillations; 3.2.4. Complements; 3.3. Random multifractal processes; 3.3.1. Levy processes; 3.3.2. Burgers' equation and Brownian motion; 3.3.3. Random wavelet series; 3.4. Multifractal formalisms  
3.4.1. Besov spaces and lacunarity  
3.4.2. Construction of formalisms; 3.5. Bounds of the spectrum; 3.5.1. Bounds according to the Besov domain; 3.5.2. Bounds deduced from histograms; 3.6. The grand-canonical multifractal formalism; 3.7. Bibliography; Chapter 4. Multifractal Scaling: General Theory and Approach by Wavelets; 4.1. Introduction and summary; 4.2. Singularity exponents; 4.2.1. Holder continuity; 4.2.2. Scaling of wavelet coefficients; 4.2.3. Other scaling exponents; 4.3. Multifractal analysis; 4.3.1. Dimension based spectra; 4.3.2. Grain based spectra  
4.3.3. Partition function and Legendre spectrum

---

## Sommario/riassunto

Scaling is a mathematical transformation that enlarges or diminishes objects. The technique is used in a variety of areas, including finance and image processing. This book is organized around the notions of scaling phenomena and scale invariance. The various stochastic models commonly used to describe scaling ? self-similarity, long-range dependence and multi-fractals ? are introduced. These models are compared and related to one another. Next, fractional integration, a mathematical tool closely related to the notion of scale invariance, is discussed, and stochastic processes with prescribed

---