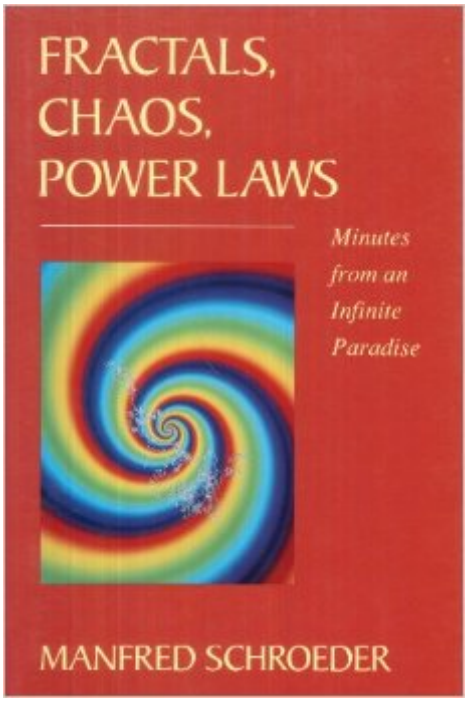
Fractals, Chaos, Power Laws: Minutes From An Infinite Paradise



Synopsis

Self-similarity is a profound concept that shapes many of the laws governing nature and underlying human thought. It is a property of widespread scientific importance and is at the centre of much of the recent work in chaos, fractals, and other areas of current research and popular interest. Self-similarity is related to svmmetry and is an attribute of many physical laws: particle physics and those governing Newton’s laws 0 , gravitation. Symmetry, found throughout the biological universe, is also a basic property of the mathematical universe. In this book the author explores the ideas of scaling, self-similarity, chaos and fractals as they appear throughout the universe of pure and applied mathematics. Because of his formidable research experience, stretching from the acoustical modelling of concert halls to pure number theory, Schroeder is able to take the reader on an intellectual excursion through this vast forest of topics.

Book Information

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Customer Reviews

What an excellent find! I’d been reading Per Bok’s "How Nature Works" and realized I need a better grounding in the basics of fractal mathematics; this book turned out to be just the ticket.Schroeder starst out with some simple, intuitive examples of curves and regions that do not scale to integral proportions, and from thse he develops and introduces the notion of the Hausdorf dimension of a curve. From there he introduces new concepts graphically- like Koch snowflakes and the Serpienski gasket- by first constructing them and then doing the analysis, introducing new concepts as needed to advance the illustration.Often Schroeder starts with very non-geometric illustrations; his section on power laws begins with a discussion of language and word frequency, and from there he

introduces Zipf’s law, and then generalizes to characteristics of power law distributions in general- but not before treating the reading to a fascinating discourse on cognates and false cognates between languages- which he manages to weave into a discussion of self-similarity. Brilliant!"Fractals, Chaos, Power Laws" could easily be used for a University-level introduction to fractal math, for graduate students or advanced undergrads- yet it’s still readable enough to be a find introduction and entertainment to the reader with only a basic background in algebra and perhaps some calculus. The casual reader might not follow all the mathmatical arguments, but he or she could still glean much from this book. Highly recommended for the mathematically inclined looking for education or entertainment.

This book can be read in two different ways:The first one is intended for the uninitiated who wants to get an introduction to chaos and fractals; the way Schroeder guides you into the chaotic phenomenae that occur everywhere around us is clear, elegant and funny. He plays with chaos and makes the reader part of this game.The second way to read this book includes a warning for scholars: This is not a textbook! The mathematical background used to explain this game is strong. Shcroeder lets the committed reader to work with the maths by himself, so you must have paper, pencil, and computer near to you in order to enjoy the book’s whole potential, in this case Shcroeder has all the experience and knowledge on the matter to guide you through "this infinte paradise" in a very firm way.The only thing I’d wish from this book was a new hardcover edition, I’ve read it so many times that my copy is getting very spoiled.If you are still interested after reading this book, but you want a little help with your maths then I’d recommend "Chaos Theory Tamed" by Garnett P. Williams. It will do the trick. However if you just want to fall in love with chaos without complications, then you should read "Chaos: The Making of a New Science" by James Gleick.

If you’ve had some background in this kind of mathematics, or are otherwise familiar with concepts like limits and Lebesgue measure, you should thoroughly enjoy this well-written and good-humored introduction to fractals, chaos, and related topics. Do not, however, undertake to read this book as an easy introduction to those topics, because Schroeder uses a number of terms without bothering to define them, and covers a lot of ground in each chapter, from the perspective of a non-mathematician/physicist, at least.For a shorter, gentler introduction to this material, I recommend R.L. Devaney’s "Chaos, Fractals, and Dynamics: Computer Experiments...," which contains BASIC code to allow you to play with these systems on your computer. If that piques your interest enough, you can then turn to Schroeder’s book for a broader and fuller treatment of these

ideas.

This book explores many cases of self similar structures that give rise to fractals .It is not mathematically oriented and the few mathematical arguments are easy .It is full of examples of anecdotical character demonstrating power laws and self similarity (concert halls , music , image treatment etc) .There are also some nice pictures .However it is not by any account a book concerning the chaos theory .As a physicist I have been disappointed .It is too long to be a book on fractal esthetics and it is too short and too anecdotical to be a book about non linear dynamics .The only description I can find would be : entertaining mathematical games on the concept of iteration and self similarity .

For the uninitiated! --The author combines insight with story telling. He has a story to tell, and does it well! Not only does he know the theory inside out, he has the ability to get accross the central points so it (almost) seems easy, in any case entertaining, using pictures (including cartoons), humor, and equations when they are needed. He further make clear the many fascinating links between chaos theory, algorithms, technology, and areas of pure math, such as number theory. Highly recommended!

This book is a complete guide of all possible situations in science where you may encounter chaos. It provides for every situation an intuitive as well as very formal view of every problem and the corresponding solution. The main drawback concerns its relative inaccessibility for non-scientific people, it requires a quite important scientific background to understand the formal part. Anyway, even for the lay-man, it can be interesting to read, in order to understand the widespread of chaos and non-linearity in real-life situations, not just the purely scientific-related ones.However, the treatment is terrific, with excellent description and explanations of the how’s and why’s, at an intuitive level as well as a very rigorous one ! I don’t think i’ve ever read a book of such a high quality...This book is worth its price, and without a doubt deserves the time you’ll need to go through it.

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