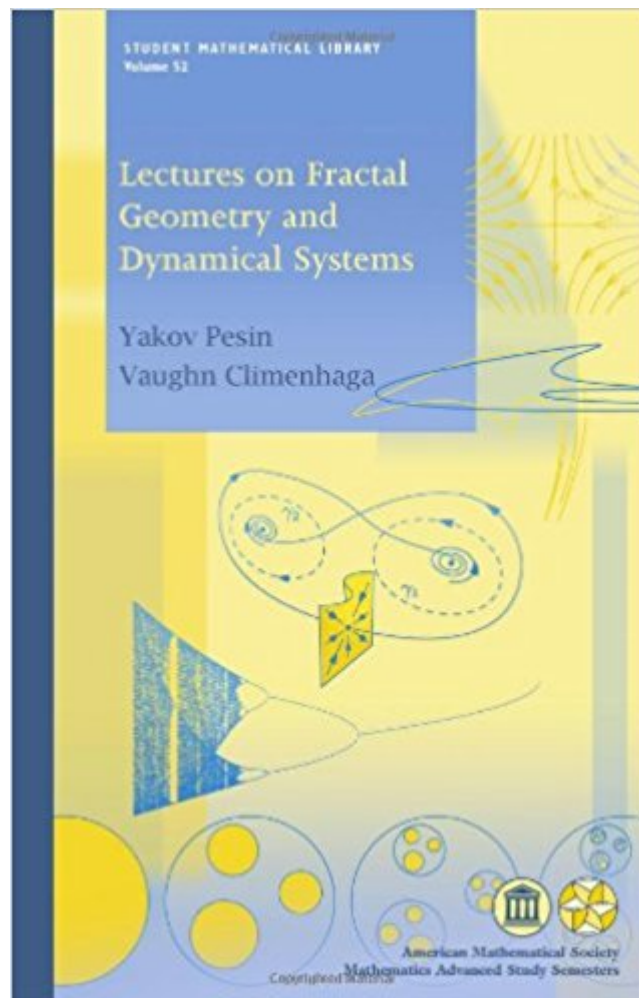




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# Lectures On Fractal Geometry And Dynamical Systems (Student Mathematical Library)



## Synopsis

Both fractal geometry and dynamical systems have a long history of development and have provided fertile ground for many great mathematicians and much deep and important mathematics. These two areas interact with each other and with the theory of chaos in a fundamental way: many dynamical systems (even some very simple ones) produce fractal sets, which are in turn a source of irregular "chaotic" motions in the system. This book is an introduction to these two fields, with an emphasis on the relationship between them. The first half of the book introduces some of the key ideas in fractal geometry and dimension theory--Cantor sets, Hausdorff dimension, box dimension--using dynamical notions whenever possible, particularly one-dimensional Markov maps and symbolic dynamics. Various techniques for computing Hausdorff dimension are shown, leading to a discussion of Bernoulli and Markov measures and of the relationship between dimension, entropy, and Lyapunov exponents. In the second half of the book some examples of dynamical systems are considered and various phenomena of chaotic behaviour are discussed, including bifurcations, hyperbolicity, attractors, horseshoes, and intermittent and persistent chaos. These phenomena are naturally revealed in the course of our study of two real models from science--the FitzHugh-Nagumo model and the Lorenz system of differential equations. This book is accessible to undergraduate students and requires only standard knowledge in calculus, linear algebra, and differential equations. Elements of point set topology and measure theory are introduced as needed. This book is a result of the MASS course in analysis at Penn State University in the fall semester of 2008.

## Book Information

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## Customer Reviews

"[F]or a student with a reasonable background in topology and measure theory this is a very useful book covering many of the main ideas in fractal geometry and dynamical systems in an accessible way, with a particular emphasis on dynamically-defined fractals." ---- Ian Melbourne, Mathematical Reviews

This book is not supposed to teach you chaos/fractals from scratch. The book is too shabby for self-study. It has a collection of lectures that are not very neatly organized. The only reason I purchased this book was because I took a class by the author. If you want to learn Chaos and Fractals, there are better books available.

That said the book has a lot of good fundamentals but they are not useable for ordinary people and there is no help in computer code either. If you are going to publish a series of lectures, you should make them ones are not just basic, but useful as well. As far as originality goes the book falls short as well. I'm only reviewing the book because it is better than five others I checked out from the library which I would give one star if I bothered to review them. I'll give you a much better alternative: *Nonlinear Dynamics And Chaos: With Applications To Physics, Biology, Chemistry, And Engineering (Studies in Nonlinearity)* The book misses Hurst exponents and the Pareto function which Mandelbrot thought important.

So far I've read the first chapter and skimmed some other parts, and it is very readable for someone with a math background, like for example a math major taking upper division math classes in college. Much more readable than most math textbooks - more paragraphs of discussion than formal proofs. I am finding it very interesting and useful, but it probably depends on your exact background.

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