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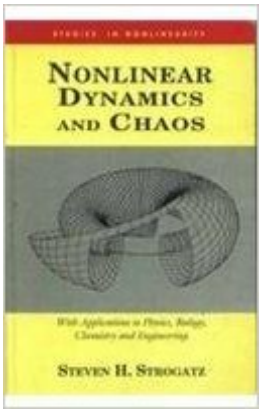
Nonlinear Dynamics And Chaos



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Synopsis

This textbook is aimed at newcomers to nonlinear dynamics and chaos, especially students taking a first course in the subject. The presentation stresses analytical methods, concrete examples and geometric intuition. The theory is developed systematically, starting with first-order differential equations and their bifurcations, followed by phase plane analysis, limit cycles and their bifurcations, and culminating with the lorenz equations, chaos, iterated maps, period doubling, renormalization, fractals, and strange attractors.a unique feature of the book is its emphasis on applications. These include mechanical vibrations, lasers, biological rhythms, superconducting circuits, insect outbreaks, chemical oscillators, genetic control systems, chaotic waterwheels, and even a technique for using chaos to send secret messages. In each case, the scientific background is explained at an elementary level and closely integrated with the mathematical theory.richly illustrated, and with many exercises and worked examples, this book is ideal for an introductory course at the junior/senior or first-year graduate level. It is also ideal for the scientist who has not had formal instruction in nonlinear dynamics, but who now desires to begin informal study. The prerequisites are multivariable calculus and introductory physics.

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Customer Reviews

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An outstanding book. I’m an empirical biologist with just a bit of (long distant) math background. This has been excellent source for me to supplement a systems biology course I am developing. I cannot say enough about how much I appreciate the appeal to intuition and specific examples and not just a series of one equation derivation after another. Well worth it!

Good text book for nonlinear dynamics. Probably the most quoted text on the subject. You tube videos of his intro course at Cornell follow book and are very worthwhile.

This book is a fine way to gain a solid working introduction to non-linear dynamics. Written by an applied mathematician working in the area, the text is conceptually rich, while keeping mathematical formalism at a minimum. A good place to start!

An outstanding textbook that avoids the usual mathematics pitfall of being painfully dry. The book teaches how to approach problems and which techniques work best for which situations, instead of just the techniques themselves. Also, the Kindle edition of this book is likely the best Kindle edition of any textbook I’ve seen.

This book reads like a physics book rather than the pure maths style of Lemma-proof-theorem-proof-corollary-proof format. Strogatz creates and sustains a compelling narrative that always reminds you why you are learning this in the first place, and occasionally sacrifices rigour to sustain the overarching storyline. His voice shines through in this book and it’s like he’s there teaching the material to you, rather than just trying to present the facts in a complete

manner. The exercises have hints given when the approach is not clear to a person first learning the subject (this is unusual, unlike texts like Artin's Algebra or any book by Hardy). As such this book does not exclude people of average intellect (such as myself) trying to learn the subject. Highly recommended reading for applied mathematics/mathematical physics students.

Strogatz is very applications-oriented in his writing. Every chapter builds a framework of analyzing nonlinear systems that is immediately applied to tumor growth, lasing thresholds, insect outbreaks, predator-prey population models, and a few other things. Reading this feels like a mathematician invited you to his house for coffee, but the coffee table is a chalkboard. It's a very casual textbook, for upper-division math, and quite popular among engineering schools as well. I would highly recommend it as part of your studies.

Initially, I strongly disliked this book and the course I was taking it along side of. However, I found that Strogatz has his lectures on Youtube for this course and I started watching those. Watch it! He's a tremendous lecturer! The first four chapters are really pressing the same points over and over, but then, it good, and it turns out the recitation was worth drilling in.

This is probably the best math book I've ever read. Unlike other stuffy books, this one is very personable and informal. It is extremely readable, the explanations are crystal-clear and very intuitive and well-motivated, plus the author inserts a lot of humor (it's so nice to be reminded that mathematicians are humans). There are fascinating examples culled from applications. I should note two things. First, it is not a proof-based book. It discuesses the cool theorems and gives intuitive justifications, but the author is clear that his goal is to build intuition and give experience with the techniques, rather than mathematical rigor (thankfully, he is honest about this and points to areas where more rigor could be introduced, rather than giving the unnatural and awkward hybrid of rigor and intuition attempted by many calculus books). Second, a lot of the problems (though certainly not all) deal with pathological and/or special cases, so it's possible for teachers to give fairly onerous homeworks.

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