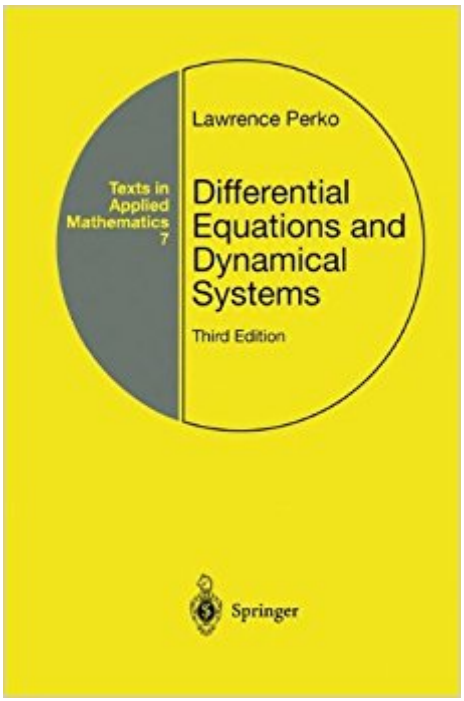
Differential Equations And Dynamical Systems (Texts In Applied Mathematics)



Synopsis

This textbook presents a systematic study of the qualitative and geometric theory of nonlinear differential equations and dynamical systems. Although the main topic of the book is the local and global behavior of nonlinear systems and their bifurcations, a thorough treatment of linear systems is given at the beginning of the text. All the material necessary for a clear understanding of the qualitative behavior of dynamical systems is contained in this textbook, including an outline of the proof and examples illustrating the proof of the Hartman-Grobman theorem. In addition to minor corrections and updates throughout, this new edition includes materials on higher order Melnikov theory and the bifurcation of limit cycles for planar systems of differential equations.

Book Information

Series: Texts in Applied Mathematics (Book 7)

Hardcover: 557 pages

Publisher: Springer; 3rd edition (April 1, 2006)

Language: English

ISBN-10: 0387951164

ISBN-13: 978-0387951164

Product Dimensions: 6.1 x 1.2 x 9.2 inches

Shipping Weight: 2.2 pounds (View shipping rates and policies)

Average Customer Review: 3.2 out of 5 stars 14 customer reviews

Best Sellers Rank: #402,367 in Books (See Top 100 in Books) #99 inÃ Â Books > Science & Math > Physics > System Theory #110 inÃ Â Books > Engineering & Transportation > Engineering > Chemical > Fluid Dynamics #225 inÃ Â Books > Science & Math > Mathematics > Applied > Differential Equations

Customer Reviews

Reviews from the first edition: Ã¢â ¬Å“...The text succeeds admiraby ... Examples abound, figures are used to advantage, and a reasonable balance is maintained between what is proved in detail and what is asserted with supporting references ... Each section closes with a set of problems, many of which are quite interesting and round out the text material ... this book is to be highly recommended both for use as a text, and for professionals in other fields wanting to gain insight into modern aspects of the geometric theory of continuous (i.e., not discrete) dynamical systems.Ã¢â ¬Â• MATHEMATICAL REVIEWS

Ã Â This textbook presents a systematic study of the qualitative and geometric theory of nonlinear differential equations and dynamical systems. Although the main topic of the book is the local and global behavior of nonlinear systems and their bifurcations, a thorough treatment of linear systems is given at the beginning of the text. All the material necessary for a clear understanding of the qualitative behavior of dynamical systems is contained in this textbook, including an outline of the proof and examples illustrating the proof of the Hartman-Grobman theorem, the use of the Poincare map in the theory of limit cycles, the theory of rotated vector fields and its use in the study of limit cycles and homoclinic loops, and a description of the behavior and termination of one-parameter families of limit cycles. In addition to minor corrections and updates throughout, this new edition contains materials on higher order Melnikov functions and the bifurcation of limit cycles for planar systems of differential equations, including new sections on Francoise's algorithm for higher order Melnikov functions and on the finite codimension bifurcations that occur in the class of bounded quadratic systems.

This text was the assigned text for the first semester of a graduate level mathematical modeling course which I had taken, and it was an incredibly painful book to work with. One complaint which I often heard from classmates was the lack of examples in this text. Normally, I'd think that such a complaint is somewhat invalid for such an advanced level text, as students should be focusing more on theory than on specific problems at this stage... but the problem here is that the material contained within the text is incredibly weak on the theory and zeroes in on the same boring and uninspiring exercises... which are repeated with a "new hat" in so many sections. Theorems are stated in a manner which many people (including my own professor, whom actively conducts research in this area) found to be incredibly confusing, and a lot of the proofs read like some of the worst hand-waving ever, with never-ending references to other sources for proofs.
Rudin'sÃ Â Principles of Mathematical AnalysisÃ Â is a popular one which he often refers to, but many times, Perko will skip a detail on a proof and refer to some text which cannot be found in even some of the greatest university libraries. To me, it seems ridiculous that a student should go on a wild goose chase to piece together proofs from essentially unavailable sources, when they can actually often be done in a much simpler manner.Unfortunately, even the publisher, Springer (which is typically known for only the highest quality products), has truly dropped the ball on this book, by allowing it to be published with typos scattered EVERYWHERE... including typos which drastically affect the entire meaning of a theorem. Worse is that they have done several reprints of this precise edition of the text, and the typos which were elemented in one reprint may reoccur in the next

reprint. There was even one occasion where my professor had to provide me with an opportunity to redo an entire assignment, because he was incredibly confused by my results. As it turned out, upon going to his office for assistance in the corrections, he noticed that my text had multiple critical typos in a theorem which was to be applied to each exercise, and he had to allow me to borrow his text to copy down the correct information.My main gripe with this book is the exercises. Essentially, there is absolutely NO ingenuity or creativity on the exercises, and you essentially end up doing the same small handful of exercises over and over again, just piling on new techniques which are covered in the new section. I don’t know if repeating exercises over and over again was a deliberate effort to make students feel comfortable with the material as it was repeated, or if it was just sheer laziness. But in any event, it really wasn’t helpful, and made depending solely upon very basic concepts (often ones learned in prerequisite courses) rather than what this text should be covering very tempting. The worst part is that the exercises presented in the text, as boring and uninspiring as they are, include a ton of elementary busy work, very labor-intensive and time-consuming, to produce very meaningless results.In all fairness, this is an area of mathematics which is relatively new, and it seems that there haven’t quite been any solid "standards" which have arisen in this area yet. But in the meantime, there certainly are some better texts. There are several textbooks out there which cover this material, but each one is very unique in the manner in which it presents the material, the "essential" material needed, and the level of rigor used within. Hopefully any "standard" text which does arise is in no way inspired by this text.

This is an assigned text for my graduate level course. Overall, I think it is a decent book and covers fair amount of topics, but the impression that I am getting from this book is that it is not written under the presumption that the reader has a strong background in analysis or topology and in that sense it is a tad bit "casual" in certain definitions. My main reservation about this book is that in certain instances the text and sometimes the statements of certain theorems lack clarity and precision, and it takes a rigorous linguistic dissection of the sentences to finally understand what the theorem is saying. For a math textbook, this flaw is kind of inexcusable.

I took an upper-level undergraduate / graduate class in ODEs and dynamical systems a year ago and it used this textbook. Perko is decent introduction to dynamical systems, but it is best used with a few supplementary texts (specifically, Smale, Hirsch and Devaney’s Differential Equations, Dynamical Systems, and an Introduction to Chaos, and V.I. Arnol’d’s Ordinary Differential Equations). I agree with the reviewer who calls it "a very good graduate ODEs textbook with some

flaws" -- that’s generally how I felt about it, too.

This book, is one of the best books in ODE’s. It include for example the proof od the Hartman Grobman Theorem.

The kindle is a fine piece of technology and I have heard from my colleagues that most textbooks translate well into that format, but something went wrong in the conversion of this textbook. I do not know what it is, and it may even be fixed by the time you read this, but the version that I have on my kindle will occasionally scatter the math text around the page. I think this is something that can be fixed eventually. Most of the text renders the way it is supposed to. And most of the time if the text does something weird I can figure out what it is supposed to say. However, there are a few times when it is just too badly scattered to figure out. The problem appears on both my Kindle and on my computer with KindlePC, so I am sure the problem is with the book itself.So far the worst instance of the book not rendering correctly is problem 5 at the end of section 1.9. I was forced to borrow my instructor’s book to finish the homework assignment.As far as the text itself, I cannot say much good or bad about it. Differential Equations is not my favorite subject, and the text is just kind of boring. I do not know if that is completely my own bias or if the textbook is poor or something in between, but I was not impressed.But if you must get this book, do not get it in electronic form.

Have had/used this text before. Very good treatment of global theory. Problems are challenging and really make you think.

This book was required for my class. It is a good book if you know the topic and want to use it as a reference. Very strong material, but I feel like I could have learned the material better from a friendlier book.But that is opinion based, maybe you’ll have better luck (I might just be stupid?).

the content of the book is outstanding. unfortunately the hardcover binding fell off before i even made it through chapter 1 - quite disappointing. I would return and demand a refund bu I unfortunately need the book on a daily basis for class. not sure who printed this, but screwed me over on this one.

[Differential Equations, Dynamical Systems, and an Introduction to Chaos [DIFFERENTIAL EQUATIONS, DYNAMICAL SYSTEMS, AND AN INTRODUCTION TO CHAOS BY Hirsch, Morris

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