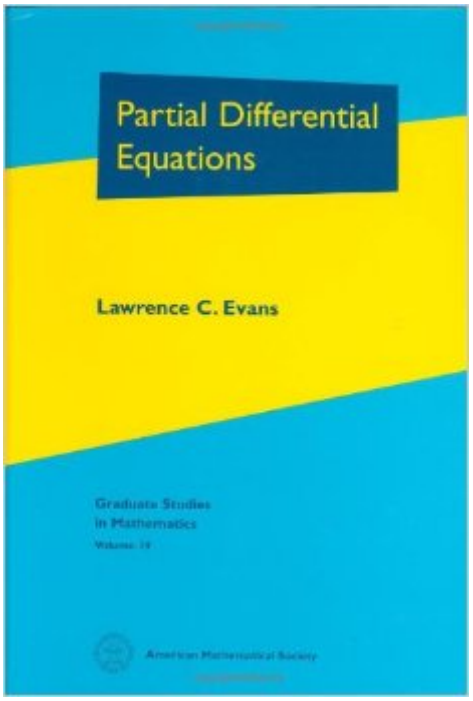
Partial Differential Equations (Graduate Studies In Mathematics, Vol. 19)



Synopsis

This text gives a comprehensive survey of modern techniques in the theoretical study of partial differential equations (PDEs) with particular emphasis on nonlinear equations. The exposition is divided into three parts: representation formulas for solutions; theory for linear partial differential equations; and theory for nonlinear partial differential equations. Included are complete treatments of the method of characteristics; energy methods within Sobolev spaces; regularity for second-order elliptic, parabolic, and hyperbolic equations; maximum principles; the multidimensional calculus of variations; viscosity solutions of Hamilton-Jacobi equations; shock waves and entropy criteria for conservation laws; and, much more.The author summarizes the relevant mathematics required to understand current research in PDEs, especially nonlinear PDEs. While he has reworked and simplified much of the classical theory (particularly the method of characteristics), he primarily emphasizes the modern interplay between functional analytic insights and calculus-type estimates within the context of Sobolev spaces. Treatment of all topics is complete and self-contained. The book's wide scope and clear exposition make it a suitable text for a graduate course in PDEs.

Book Information

Hardcover: 662 pages
Publisher: Amer Mathematical Society; 1st edition (June 1, 1998)
Language: English
ISBN-10: 0821807722
ISBN-13: 978-0821807729
Product Dimensions: 1.5 x 7.5 x 10.5 inches
Shipping Weight: 2.8 pounds
Average Customer Review: 4.6 out of 5 starsÂ Â See all reviewsÂ (35 customer reviews)
Best Sellers Rank: #810,429 in Books (See Top 100 in Books) #381 inÂ Books > Science & Math > Mathematics > Applied > Differential Equations #7710 inÂ Books > Textbooks > Science & Mathematics > Mathematics

Customer Reviews

If you are just getting started in learning PDEs and want to see all the classical problems/solutions (Poisson, Laplace, Heat, and Wave Equations), then this book might be a little advanced for you, but it is solid in this content if you have a solid background in analysis (probably best to have at least one high-level analysis class that covers all the multivariable calculus material as you will find that your ability to identify and use Green's Theorems will make life much easier as you get started).

This is considered "Part I" of the book.Once you have covered all the nice problems that don't exist in practice, you are ready to move onto general linear PDE theory in Part II of the book. I would recommend you complete a course in measure theory before you start in on chapter 5, which covers Sobolev spaces. I would then recommend that you complete a course in functional analysis before starting chapter 6 or 7 (chapters 5-7 are Part II of this book). This is not necessary as you will have access to a fairly complete appendix of functional analysis results in this book, but once you understand functional analysis and measure theory, then you will be able to grasp the idea of an elliptic (or in chapter 7, parabolic or hyperbolic) operator acting on a function space (the function space being a Sobolev space) more easily and these ideas won't seem so abstract. Overall, the second part of this book is great if you have a lot of the prerequisites I just suggested because many of the proofs can easily be made to be three to five times longer as many steps that link ideas in functional analysis are skipped. The proofs on higher regularity will be hard to understand your first time through, so I wouldn't worry about it too much.

Student Solutions Manual to accompany Partial Differential Equations: An Introduction, 2nd Edition Partial Differential Equations: Analytical and Numerical Methods, Second Edition Partial Differential Equations: An Introduction, 2nd Edition