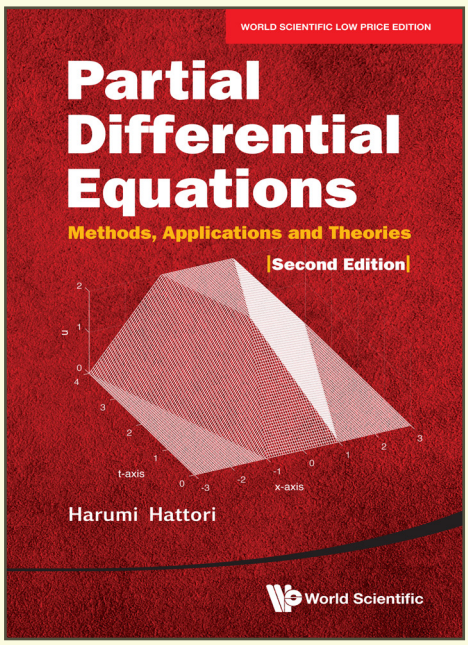
Partial Differential Equations, 2nd Edition

Methods, Applications and Theories



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ABOUT THE BOOK

This is an introductory level textbook for partial differential equations (PDEs). It is suitable for a one-semester undergraduate level or two-semester graduate level course in PDEs or applied mathematics. This volume is application-oriented and rich in examples. Going through these examples, the reader is able to easily grasp the basics of PDEs.

Chapters One to Five are organized to aid understanding of the basic PDEs. They include the first-order equations and the three fundamental second-order equations, i.e. the heat, wave and Laplace equations. Through these equations, we learn the types of problems, how we pose the problems, and the methods of solutions such as the separation of variables and the method of characteristics. The modeling aspects are explained as well. The methods introduced in earlier chapters are developed further in Chapters Six to Twelve. They include the Fourier series, the Fourier and the Laplace transforms, and the Green's functions. Equations in higher dimensions are also discussed in detail. In this second edition, a new chapter is added and numerous improvements have been made including the reorganization of some chapters. Extensions of nonlinear equations treated in earlier chapters are also discussed.

Partial differential equations are becoming a core subject in Engineering and the Sciences. This textbook will greatly benefit those studying in these subjects by covering basic and advanced topics in PDEs based on applications.

READERSHIP

Undergraduate students in mathematics, science, and engineering.

CONTENTS

- First and Second Order Linear Equations - Preparation
- Heat Equation
- Wave Equation
- Laplace Equation
- First Order Equations
- Fourier Series and Eigenvalue Problems
- Separation of Variables in Higher Dimensions
- More Separation of Variables
- Fourier Transform
- Laplace Transform
- Green's Functions
- Applications

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