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| Nota di contenuto | 0 Goals of this Book and Global Overview; Contents; 0.1 What is this Book?; 0.2 Why has this Book Been Written?; 0.3 For Whom is this Book Intended?; 0.4 Why Should I Read this Book?; 0.5 The Structure of this Book; 0.6 What this Book Does Not Cover; 0.7 Contact, Feedback and More Information; Part I The Continuous Theory Of Partial Differential Equations; 1 An Introduction to Ordinary Differential Equations; 1.1 Introduction and Objectives; 1.2 Two-Point Boundary Value Problem; 1.2.1 Special Kinds of Boundary Condition; 1.3 Linear Boundary Value Problems; 1.4 Initial Value Problems 1.5 Some Special Cases 1.6 Summary and Conclusions; 2 An Introduction to Partial Differential Equations; 2.1 Introduction and Objectives; 2.2 Partial Differential Equations; 2.3 Specialisations; 2.3.1 Elliptic Equations; 2.3.2 Free Boundary Value Problems; 2.4 Parabolic Partial Differential Equations; 2.4.1 Special Cases; 2.5 Hyperbolic Equations; 2.5.1 Second-Order Equations; 2.5.2 First-Order Equations; |

2.6 Systems of Equations; 2.6.1 Parabolic Systems; 2.6.2 First-Order Hyperbolic Systems; 2.7 Equations Containing Integrals; 2.8 Summary and Conclusions

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5.3 Second-Order Hyperbolic Equations 5.3.1 Numerical Integration Along the Characteristic Lines; 5.4 Applications to Financial Engineering; 5.4.1 Generalisations; 5.5 Systems of Equations; 5.5.1 An Example; 5.6 Propagation of Discontinuities; 5.6.1 Other Problems; 5.7 Summary and Conclusions; Part II Finite Difference Methods: The Fundamentals; 6 An Introduction to the Finite Difference Method; 6.1 Introduction and Objectives; 6.2 Fundamentals of Numerical Differentiation; 6.3 Caveat: Accuracy and Round-Off Errors; 6.4 Where are Divided Differences Used in Instrument Pricing?

6.5 Initial Value Problems

Sommario/riassunto

The world of quantitative finance (QF) is one of the fastest growing areas of research and its practical applications to derivatives pricing problem. Since the discovery of the famous Black-Scholes equation in the 1970's we have seen a surge in the number of models for a wide range of products such as plain and exotic options, interest rate derivatives, real options and many others. Gone are the days when it was possible to price these derivatives analytically. For most problems we must resort to some kind of approximate method. In this book we employ partial differential equations (PDE) to