

1. Record Nr.	UNINA9910145039503321
Autore	Duffy Daniel J
Titolo	Finite difference methods in financial engineering [[electronic resource]] : a partial differential equation approach // Daniel J. Duffy
Pubbl/distr/stampa	Chichester, England ; ; Hoboken, NJ, : John Wiley, c2006
ISBN	1-118-85648-1 1-118-67344-1 1-280-41120-1 9786610411207 0-470-85883-4
Descrizione fisica	1 online resource (441 p.)
Collana	Wiley finance series
Classificazione	QK 660 SK 980
Disciplina	332.60151
Soggetti	Financial engineering - Mathematics Derivative securities - Prices - Mathematical models Finite differences Differential equations, Partial - Numerical solutions Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references (p. [409]-416) and index.
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

3 Second-Order Parabolic Differential Equations 3.1 Introduction and Objectives; 3.2 Linear Parabolic Equations; 3.3 The Continuous Problem; 3.4 The Maximum Principle for Parabolic Equations; 3.5 A Special Case: One-Factor Generalised Black-Scholes Models; 3.6 Fundamental Solution and the Green's Function; 3.7 Integral Representation of the Solution of Parabolic PDEs; 3.8 Parabolic Equations in One Space Dimension; 3.9 Summary and Conclusions; 4 An Introduction to the Heat Equation in One Dimension; 4.1 Introduction and Objectives; 4.2 Motivation and Background 4.3 The Heat Equation and Financial Engineering 4.4 The Separation of Variables Technique; 4.4.1 Heat Flow in a Road with Ends Held at Constant Temperature; 4.4.2 Heat Flow in a Rod Whose Ends are at a Specified Variable Temperature; 4.4.3 Heat Flow in an Infinite Rod; 4.4.4 Eigenfunction Expansions; 4.5 Transformation Techniques for the Heat Equation; 4.5.1 Laplace Transform; 4.5.2 Fourier Transform for the Heat Equation; 4.6 Summary and Conclusions; 5 An Introduction to the Method of Characteristics; 5.1 Introduction and Objectives; 5.2 First-Order Hyperbolic Equations; 5.2.1 An Example 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
