

1. Record Nr.	UNINA9910814815703321
Autore	O'Neil Peter V.
Titolo	Beginning partial differential equations / / Peter V. O'Neil
Pubbl/distr/stampa	Hoboken, New Jersey : , : Wiley, , 2014 2014
ISBN	1-118-83210-8
Edizione	[Third edition.]
Descrizione fisica	1 online resource (453 p.)
Collana	Pure and Applied Mathematics: A Wiley Series of Texts, Monographs and Tracts
Classificazione	MAT007000
Disciplina	515/.353
Soggetti	Differential equations, Partial
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Includes index.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Beginning Partial Differential Equations; Copyright; Contents; Preface; 1 First Ideas; 1.1 Two Partial Differential Equations; 1.1.1 The Heat, or Diffusion, Equati; 1.1.2 The Wave Equation; 1.2 Fourier Series; 1.2.1 The Fourier Series of a Function; 1.2.2 Fourier Sine and Cosine Series; 1.3 Two Eigenvalue Problems; 1.4 A Proof of the Fourier Convergence Theorem; 1.4.1 The Role of Periodicity; 1.4.2 Dirichlet's Formula; 1.4.3 The Riemann-Lebesgue Lemma; 1.4.4 Proof of the Convergence Theorem; 2 Solutions of the Heat Equation; 2.1 Solutions on an Interval [0, L] 2.1.1 Ends Kept at Temperature Zero2.1.2 Insulated Ends; 2.1.3 Ends at Different Temperatures; 2.1.4 A Diffusion Equation with Additional Terms; 2.1.5 One Radiating End; 2.2 A Nonhomogeneous Problem; 2.3 The Heat Equation in Two Space Variables; 2.4 The Weak Maximum Principle; 3 Solutions of the Wave Equation; 3.1 Solutions on Bounded Intervals; 3.1.1 Fixed Ends; 3.1.2 Fixed Ends with a Forcing Term; 3.1.3 Damped Wave Motion; 3.2 The Cauchy Problem; 3.2.1 d'Alembert's Solution; 3.2.1.1 Forward and Backward Waves; 3.2.2 The Cauchy Problem on a Half Line 3.2.3 Characteristic Triangles and Quadrilaterals3.2.4 A Cauchy Problem with a Forcing Term; 3.2.5 String with Moving Ends; 3.3 The Wave Equation in Higher Dimensions; 3.3.1 Vibrations in a Membrane with Fixed Frame; 3.3.2 The Poisson Integral Solution; 3.3.3 Hadamard's Method of Descent; 4 Dirichlet and Neumann Problems; 4.1

Laplace's Equation and Harmonic Functions; 4.1.1 Laplace's Equation in Polar Coordinates; 4.1.2 Laplace's Equation in Three Dimensions; 4.2 The Dirichlet Problem for a Rectangle; 4.3 The Dirichlet Problem for a Disk; 4.3.1 Poisson's Integral Solution  
 4.4 Properties of Harmonic Functions4.4.1 Topology of  $R^n$ ; 4.4.2 Representation Theorems; 4.4.2.1 A Representation Theorem in  $R^3$ ; 4.4.2.2 A Representation Theorem in the Plane; 4.4.3 The Mean Value Property and the Maximum Principle; 4.5 The Neumann Problem; 4.5.1 Existence and Uniqueness; 4.5.2 Neumann Problem for a Rectangle; 4.5.3 Neumann Problem for a Disk; 4.6 Poisson's Equation; 4.7 Existence Theorem for a Dirichlet Problem; 5 Fourier Integral Methods of Solution; 5.1 The Fourier Integral of a Function; 5.1.1 Fourier Cosine and Sine Integrals; 5.2 The Heat Equation on the Real Line  
 5.2.1 A Reformulation of the Integral Solution5.2.2 The Heat Equation on a Half Line; 5.3 The Debate over the Age of the Earth; 5.4 Burger's Equation; 5.4.1 Traveling Wave Solutions of Burger's Equation; 5.5 The Cauchy Problem for the Wave Equation; 5.6 Laplace's Equation on Unbounded Domains; 5.6.1 Dirichlet Problem for the Upper Half Plane; 5.6.2 Dirichlet Problem for the Right Quarter Plane; 5.6.3 A Neumann Problem for the Upper Half Plane; 6 Solutions Using Eigenfunction Expansions; 6.1 A Theory of Eigenfunction Expansions; 6.1.1 A Closer Look at Expansion Coefficients  
 6.2 Bessel Functions

---

## Sommario/riassunto

"Featuring a challenging, yet accessible, introduction to partial differential equations, Beginning Partial Differential Equations provides a solid introduction to partial differential equations, particularly methods of solution based on characteristics, separation of variables, as well as Fourier series, integrals, and transforms. Thoroughly updated with novel applications, such as Poe's pendulum and Kepler's problem in astronomy, this third edition is updated to include the latest version of Maples, which is integrated throughout the text. New topical coverage includes novel applications, such as Poe's pendulum and Kepler's problem in astronomy"--  
 "This Third Edition provides a solid introduction to partial differential equations, particularly methods of solution based on characteristics, separation of variables, as well as Fourier series, integrals, and transforms"--

---