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Titolo	Applied Partial Differential Equations [[electronic resource] /] / by J. David Logan
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Descrizione fisica	1 online resource (XII, 181 p.)
Collana	Undergraduate Texts in Mathematics, , 0172-6056
Classificazione	35-01
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Soggetti	Mathematical analysis Analysis (Mathematics) Analysis
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Formato	Materiale a stampa
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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	1: The Physical Origins of Partial Differential Equations -- 1.1 Mathematical Models -- 1.2 Conservation Laws -- 1.3 Diffusion -- 1.4 Contaminant Transport in Aquifers* -- 1.5 Vibrations of a String -- 1.6 Quantum Mechanics* -- 1.7 Heat Flow in Three Dimensions -- 1.8 Laplace's Equation -- 1.9 Acoustics* -- 1.10 Classification of PDEs -- 2: Partial Differential Equations on Unbounded Domains -- 2.1 Cauchy Problem for the Heat Equation -- 2.2 Cauchy Problem for the Wave Equation -- 2.3 Ill-Posed Problems -- 2.4 Semi-Infinite Domains -- 2.5 Sources and Duhamel's Principle -- 2.6 Laplace Transforms -- 2.7 Fourier Transforms -- 2.8 Solving PDEs Using Computer Algebra Packages -- 3: Orthogonal Expansions -- 3.1 The Fourier Method -- 3.2 Orthogonal Expansions -- 3.3 Classical Fourier Series -- 3.4 Sturm-Liouville Problems -- 4: Partial Differential Equations on Bounded Domains -- 4.1 Separation of Variables -- 4.2 Flux and Radiation Conditions -- 4.3 Laplace's Equation -- 4.4 Cooling of a Sphere -- 4.5 Diffusion in a Disk -- 4.6 Sources on Bounded Domains -- 4.7 Parameter Identification Problems* -- 4.8 Finite Difference Methods* -- Appendix: Ordinary Differential Equations -- Table of Laplace Transforms -- References.
Sommario/riassunto	This textbook is for the standard, one-semester, junior-senior course that often goes by the title "Elementary Partial Differential Equations" or

"Boundary Value Problems;' The audience usually consists of stu- dents in mathematics, engineering, and the physical sciences. The topics include derivations of some of the standard equations of mathematical physics (including the heat equation, the· wave equation, and the Laplace's equation) and methods for solving those equations on bounded and unbounded domains. Methods include eigenfunction expansions or separation of variables, and methods based on Fourier and Laplace transforms. Prerequisites include calculus and a post-calculus differential equations course. There are several excellent texts for this course, so one can legitimately ask why one would wish to write another. A survey of the content of the existing titles shows that their scope is broad and the analysis detailed; and they often exceed five hundred pages in length. These books gen- erally have enough material for two, three, or even four semesters. Yet, many undergraduate courses are one-semester courses. The author has often felt that students become a little uncomfortable when an instructor jumps around in a long volume searching for the right topics, or only par- tially covers some topics; but they are secure in completely mastering a short, well-defined introduction. This text was written to proVide a brief, one-semester introduction to partial differential equations.