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Sommario/riassunto

This updated edition is designed as a brief introduction to the fundamental particles that make up the matter in our universe. Numerous examples, figures, and simple explanations enable general readers and physics students to understand complex concepts related to the universe. Selected topics include atoms, quarks, accelerators, detectors, colliders, string theory, and more. FEATURESExplores the fundamental particles that make up the matter in our universeTopics include atoms, quarks, accelerators, detectors, colliders, string theory, and more

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Titolo	Partial Differential Equations : An Introduction to Analytical and Numerical Methods / / by Wolfgang Arendt, Karsten Urban
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Lingua di pubblicazione	Inglese
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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	1 Modeling, or where do differential equations come from -- 2 Classification and characteristics -- 3 Elementary methods -- 4 Hilbert spaces -- 5 Sobolev spaces and boundary value problems in dimension one -- 6 Hilbert space methods for elliptic equations -- 7 Neumann and Robin boundary conditions -- 8 Spectral decomposition and evolution equations -- 9 Numerical methods -- 10 Maple®, or why computers can sometimes help -- Appendix.
Sommario/riassunto	This textbook introduces the study of partial differential equations using both analytical and numerical methods. By intertwining the two complementary approaches, the authors create an ideal foundation for further study. Motivating examples from the physical sciences, engineering, and economics complete this integrated approach. A showcase of models begins the book, demonstrating how PDEs arise in practical problems that involve heat, vibration, fluid flow, and financial markets. Several important characterizing properties are used to

classify mathematical similarities, then elementary methods are used to solve examples of hyperbolic, elliptic, and parabolic equations. From here, an accessible introduction to Hilbert spaces and the spectral theorem lay the foundation for advanced methods. Sobolev spaces are presented first in dimension one, before being extended to arbitrary dimension for the study of elliptic equations. An extensive chapter on numerical methods focuses on finite difference and finite element methods. Computer-aided calculation with Maple™ completes the book. Throughout, three fundamental examples are studied with different tools: Poisson’s equation, the heat equation, and the wave equation on Euclidean domains. The Black–Scholes equation from mathematical finance is one of several opportunities for extension. Partial Differential Equations offers an innovative introduction for students new to the area. Analytical and numerical tools combine with modeling to form a versatile toolbox for further study in pure or applied mathematics. Illuminating illustrations and engaging exercises accompany the text throughout. Courses in real analysis and linear algebra at the upper-undergraduate level are assumed.