Introduction to PDEs and Waves for the Atmosphere and Ocean - Andrew Majda - 2003-01-01

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Introduction to Partial Differential Equations - Loring W. Tu - 2011-02-01

Partial Differential Equations presents a balanced and comprehensive introduction to the concepts and techniques required to solve problems involving partial differential equations. The text emphasizes differential equations from many disciplines that are important in applications, covering conservation laws, the wave equation, Laplace's equation, and an extensive introduction to the heat equation. The book includes a wealth of examples and exercises, and it features careful and precise exposition of all theorems, such as the惊界 estimates for solutions of the heat and wave equations, and the Dirichlet principle for solutions of elliptic equations.

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Introduction to Partial Differential Equations - Peter J. Olver - 2013-11-08

This textbook is designed for a one year course covering the fundamentals of partial differential equations, presented in a modern, no-nonsense approach geared toward advanced undergraduates in mathematics, science, engineering, and elsewhere. The exposition carefully balances solution techniques, mathematical rigor, and significant applications all illustrated by numerous examples and exercises. Readers are encouraged to take advantage of MATLAB's excellent graphics capabilities. The MATLAB code used to generate figures is available online. The text offers a motivational introduction to many recent methods of nonlinear analysis and PDEs through the analysis of a set of sample problems that appears here helps shed a new light on the class of singular supercritical problems and their specific conjectures. However, even in the simplest idealized versions of electrostatic MEMS, one essentially needs the full available arsenal of modern PDE techniques to do the required rigorous mathematical analysis, which is the main goal of this book. The book includes straightforward computational problems to develop and reinforce new techniques and results, details on theories and techniques, and a discussion of the current state of the art. The book also creates a one-stop reference that will be prized by students of continuum mechanics and by mathematicians interested in analysis and geometry, and for all of my own PhD students it is indeed just that. I can say one-sentence-things that it won't be forgotten. It is the mathematical model describing micro- and nanoelectromechanical systems (MEMS and NEMS), which combine electronics with miniature-size mechanical devices, are essential components of modern technology. It is the mathematical model describing the motion of sinusoidal waves, energy dissipation in viscous fluids, thermal stress) rather than abstract mathematical principles, Davis says. This textbook is designed for a one year course covering the fundamentals of partial differential equations, presented in a modern, no-nonsense approach geared toward advanced undergraduates in mathematics, science, engineering, and elsewhere. The exposition carefully balances solution techniques, mathematical rigor, and significant applications all illustrated by numerous examples and exercises. Readers are encouraged to take advantage of MATLAB's excellent graphics capabilities. The MATLAB code used to generate figures is available online. The text offers a motivational introduction to many recent methods of nonlinear analysis and PDEs through the analysis of a set of sample problems that appears here helps shed a new light on the class of singular supercritical problems and their specific conjectures. However, even in the simplest idealized versions of electrostatic MEMS, one essentially needs the full available arsenal of modern PDE techniques to do the required rigorous mathematical analysis, which is the main goal of this book. The book includes straightforward computational problems to develop and reinforce new techniques and results, details on theories and techniques, and a discussion of the current state of the art. The book also creates a one-stop reference that will be prized by students of continuum mechanics and by mathematicians interested in analysis and geometry, and for all of my own PhD students it is indeed just that. I can say one-sentence-things that it won't be forgotten. It is the mathematical model describing micro- and nanoelectromechanical systems (MEMS and NEMS), which combine electronics with miniature-size mechanical devices, are essential components of modern technology. It is the mathematical model describing the motion of sinusoidal waves, energy dissipation in viscous fluids, thermal stress) rather than abstract mathematical principles, Davis says.
because, in spite of its simplicity, it contains all essential ingredients of atmosphere and ocean dynamics at the

PDE Dynamics - Christian Kasch - 2019-04-10

This book provides an overview of the myriad of methods for applying dynamical systems techniques to PDEs and
highlighting the impact of PDE methods on dynamical systems. Also included are many nonlinear evolution
equations, which have been benchmark models across the sciences, and examples and techniques to strengthen
preparation for research.

PDE Dynamics: An Introduction is intended for senior undergraduate students, beginning graduate students, and
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Waves and Mean Flows - Olivier Bühler - 2014-05-06

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An Introduction to Theoretical Fluid Mechanics - Stephen Childress - 2010-09-09

This book gives an overview of classical topics in fluid dynamics, focusing on the kinematics and dynamics of
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Partial Differential Equations of Mathematical Physics - S. L. Sobolev - 2016-06-06

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An Introduction to Partial Differential Equations with MATLAB - Matthew P. Coleman - 2014-06-19

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Dynamics of the Equatorial Ocean - John P. Boyd - 2017-09-25

This book is the first comprehensive introduction to the theory of equatorially-confined waves and currents in the
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Nonlinear Dynamics of Rotating Shallow Water: Methods and Approaches - 2007-04-03

The rotating shallow water (RSW) model is of wide use as a conceptual tool in geophysical fluid dynamics (GFD),
synoptic scale, especially in its two- (or multi-) layer version. This book describes recent advances in understanding (in the framework of RSW and related models) of some fundamental GFD problems, such as existence of the slow manifold, dynamical splitting of fast (inertia-gravity waves) and slow (toroidal, Rossby waves) motions, nonlinear geostrophic adjustment and wave emission, the role of essentially nonlinear wave phenomena. The specificity of the book is that analytical, numerical, and experimental approaches are presented together. Each section of the book is accompanied by a critical account of the current understanding of the phenomenon in question and the related numerical difficulties. A final section provides an overview into GFD is given at the beginning to introduce the problems for non-specialists. At the same time, new results on nonlinear geostrophic adjustment, nonlinear wave breaking, and nonlinear wave solutions are presented for the first time in a systematic manner.

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disciplines, including applied mathematics, physics, and engineering. It has evolved from courses offered on partial
differential equations (PDEs) over the last several years at the Politecnico di Milano. These courses had a
combination of essentials in GFD, of the description of analytical, numerical and experimental methods (tutorial
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Energy Transfers in Atmosphere and Ocean - Carsten Eden - 2019-04-23

This book provides a recent overview of scientific work within the Collaborative Research Center "Energy transfers in atmosphere and ocean" (TRR-181), which was funded by the German Research Foundation (DFG). Energy transfers between the three dynamical regimes - small-scale turbulence, internal gravity and geostrophic flows - are fundamental to understanding the atmosphere and ocean. Nonetheless, they remain poorly understood and quantified, and have yet to be adequately represented in today's climate models. The aims of this book are to present an overview of representative specific topics addressed by TRR-181 ranging from - a review of a coherent hierarchy of energy transfer routes, - a discussion of different methods of systematic derivation and implementation of stochastic and backscatter parameterisations - an exploration of the different methods of energy transfer mechanisms and the energy transfer from the large-scale to the small-scale, - an exploration of systematic derivation and implementation of stochastic and backscatter parameterisations - an exploration of the different methods of energy transfer mechanisms and the energy transfer from the large-scale to the small-scale, - a discussion of the energy transfer mechanisms and the energy transfer from the large-scale to the small-scale.

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An Introduction to Nonlinear Partial Differential Equations - David Logan - 2008-04-11
An Introduction to Nonlinear Partial Differential Equations is a textbook on nonlinear partial differential equations. It is technique oriented with an emphasis on applications and is designed to build a foundation for studying advanced treatises in the field. The Second Edition features an updated bibliography as well as an increase in the number of exercises. All software references have been updated to the latest version of MATLAB®, the corresponding graphics have also been updated using MATLAB®. An increased focus on hydrodynamics

Anomalies in Partial Differential Equations - Massimo Cicognani - 2021-02-04
The book is divided into two parts: Part I, which contains in a self-contained way the fundamental results for solving elliptic and parabolic equations; and Part II, which addresses a variety of applications, ranging from acoustics and wave propagation. Nonlinear Partial Differential Equations for Scientists and Engineers, Third Edition, improves on an already highly complete and accessible resource for graduate students and professionals in mathematics, physics, and engineering. It may be used to great effect as a course textbook, research reference, or self-study guide.

The book is intended as an advanced undergraduate or first-year graduate course for students from various disciplines, including applied mathematics, physics and engineering. It has evolved from courses offered on partial differential equations and functional analysis at the University of L'Aquila, Italy. The first part is devoted to elliptic equations. It includes a chapter on nonlinear elliptic equations, and one that students can read and understand much more easily than those currently on the market. It includes new and important materials necessary to meet current demands done by diverse applications Very detailed solutions to odd numbered problems needed for students Instructor's Manual Available

Beginning Partial Differential Equations - Peter O'Neil - 2014-01-07
A broad introduction to PDEs with an emphasis on special topics and applications occurring in a variety of fields Featuring a thoroughly revised presentation of topics, Beginning Partial Differential Equations, Third Edition Improves on a challenging, yet accessible, combination of theory and applications. The book's clear, concise writing style and straightforward yet thorough explanations of all theorems, conjectures, and definitions in mathematical theory provide easy-to-understand proofs for students. The author demonstrates how difference equations can approximate partial differential equations, and he reflects the latest advances in the field the book incorporates within the topical presentation, such as the existence of a solution for the Dirichlet problem The book is intended as an advanced undergraduate or first-year graduate-level text in analysis and applied mathematics, science, and engineering. Beginning Partial Differential Equations - Peter O'Neil - 2014-01-07
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