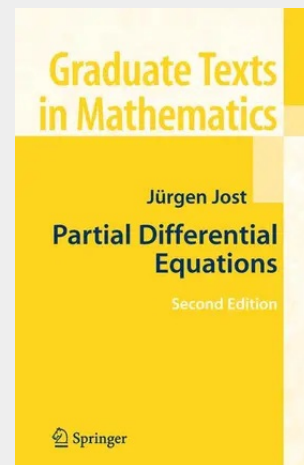


Partial Differential Equations

This book offers an ideal introduction to the theory of partial differential equations. It focuses on elliptic equations and systematically develops the relevant existence schemes, always with a view towards nonlinear problems. It also develops the main methods for obtaining estimates for solutions of elliptic equations: Sobolev space theory, weak and strong solutions, Schauder estimates, and Moser iteration. It also explores connections between elliptic, parabolic, and hyperbolic equations as well as the connection with Brownian motion and semigroups. This second edition features a new chapter on reaction-diffusion equations and systems.

This book is intended for students who wish to get an introduction to the theory of partial differential equations. The author focuses on elliptic equations and systematically develops the relevant existence schemes, always with a view towards nonlinear problems. These are maximum principle methods (particularly important for numerical analysis schemes), parabolic equations, variational methods, and continuity methods. This book also develops the main methods for obtaining estimates for solutions of elliptic equations: Sobolev space theory, weak and strong solutions, Schauder estimates, and Moser iteration. Connections between elliptic, parabolic, and hyperbolic equations are explored, as well as the connection with Brownian motion and semigroups. This book can be utilized for a one-year course on partial differential equations. For the new edition the author has added a new chapter on reaction-diffusion equations and systems. There is also new material on Neumann boundary value problems, Poincaré inequalities, expansions, as well as a new proof of the Hölder regularity of solutions of the Poisson equation. Jürgen Jost is Co-Director of the Max Planck Institute for Mathematics in the Sciences and Professor of Mathematics at the University of Leipzig. He is the author of a number of Springer books, including Dynamical Systems (2005), Postmodern Analysis (3rd ed. 2005, also translated into Japanese), Compact Riemann Surfaces (3rd ed. 2006) and Riemannian Geometry and Geometric Analysis (4th ed., 2005). The present book is an expanded translation of the original German version, Partielle Differentialgleichungen (1998). About the first edition: Because of the nice global presentation, I recommend this book to students and young researchers who need the now classical properties of these second-order partial differential equations. Teachers will also find in this textbook the basis of an introductory course on second-order partial differential equations. - Alain Brillard, Mathematical Reviews Beautifully written and superbly well-organised, I strongly recommend this book to anyone seeking a stylish, balanced, up-to-date survey of this central area of mathematics. - Nick Lord, The Mathematical Gazette



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