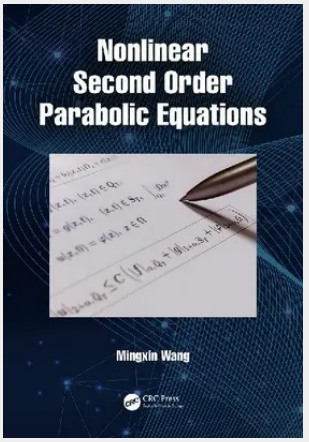
Wang

Nonlinear Second Order Parabolic Equations



The parabolic partial differential equations model one of the most important processes in the real-world: diffusion. Whether it is the diffusion of energy in space-time, the diffusion of species in ecology, the diffusion of chemicals in biochemical processes, or the diffusion of information in social networks, diffusion processes are ubiquitous and crucial in the physical and natural world as well as our everyday lives. This book is self-contained and covers key topics such as the Lp theory and Schauder theory, maximum principle, comparison principle, regularity and uniform estimates, initial-boundary value problems of semilinear parabolic scalar equations and weakly coupled parabolic systems, the upper and lower solutions method, monotone properties and long-time behaviours of solutions, convergence of solutions and stability of equilibrium solutions, global solutions and finite time blowup. It also touches on periodic boundary value problems, free boundary problems, and semigroup theory. The book covers major theories and methods of the field, including topics that are useful but hard to find elsewhere. This book is based on tried and tested teaching materials used at the Harbin Institute of Technology over the past ten years. Special care was taken to make the book suitable for classroom teaching as well as for self-study among graduate students. About the Author: Mingxin Wang is Professor of Mathematics at Harbin Institute of Technology, China. He has published ten monographs and textbooks and 260 papers. He is also a supervisor of 30 PhD students.

The book covers theories and methods of parabolic equations. Everyday examples are provided, especially from the field of ecology, while exercises after every chapter, are included. Special care is taken to make the book suitable for classroom teaching as well as for self-study for graduate students.

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