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Sommario/riassunto

This book explores the most recent developments in the theory of planar quasiconformal mappings with a particular focus on the interactions with partial differential equations and nonlinear analysis. It gives a thorough and modern approach to the classical theory and presents important and compelling applications across a spectrum of mathematics: dynamical systems, singular integral operators, inverse problems, the geometry of mappings, and the calculus of variations. It also gives an account of recent advances in harmonic analysis and their applications in the geometric theory of mappings. The book explains that the existence, regularity, and singular set structures for second-order divergence-type equations--the most important class of PDEs in applications--are determined by the mathematics underpinning the geometry, structure, and dimension of fractal sets; moduli spaces of Riemann surfaces; and conformal dynamical systems. These topics are inextricably linked by the theory of quasiconformal mappings. Further, the interplay between them allows the authors to extend classical results to more general settings for wider applicability, providing new and often optimal answers to questions of existence, regularity, and geometric properties of solutions to nonlinear systems in both elliptic and degenerate elliptic settings.