1. Record Nr. UNINA9910728949503321

Autore	Borsuk Mikhail
Titolo	Oblique Derivative Problems for Elliptic Equations in Conical Domains / / by Mikhail Borsuk
Pubbl/distr/stampa	Cham : , : Springer Nature Switzerland : , : Imprint : Birkhäuser, , 2023
ISBN	9783031283819 9783031283802
Edizione	[1st ed. 2023.]
Descrizione fisica	1 online resource (334 pages)
Collana	Frontiers in Elliptic and Parabolic Problems, , 2730-5503
Disciplina	733
Soggetti	Mathematics Differential equations Differential Equations Equacions diferencials el·líptiques Seccions còniques El·lipse (Matemàtica) Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Intro -- Contents -- List of Symbols -- 1 Introduction -- 2 Preliminaries -- 2.1 Elementary Inequalities -- 2.2 Domains with a Conical Point -- 2.3 The Quasi-Distance Function r and Its Properties -- 2.4 Function Spaces -- 2.4.1 Lebesgue Spaces -- 2.4.2 Space M(G) -- 2.4.3 Regularization and Approximation by Smooth Functions -- 2.5 Hölder and Sobolev Spaces -- 2.5.1 Notations and Definitions -- 2.5.2 Sobolev Embedding Theorems -- 2.6 Weighted Sobolev Spaces -- 2.7 Spaces of Dini Continuous Functions -- 2.8 Variable Exponent Spaces -- 2.9 The Nemyckij Operator and Its Properties -- 2.10 Some Functional Analysis -- 2.11 The Cauchy Problem for Differential Inequalities -- 2.12 The Dependence of the Eigenvalues on the Coefficients of the Differential Equation -- 2.13 Basic Properties of the Gamma and Gegenbauer Functions -- 2.14 Additional Auxiliary Results -- 2.14.1 The Stampacchia Lemma -- 2.14.2 Other Assertions -- 2.15 Notes -- 3 Eigenvalue Problems -- 3.1 The Linear Eigenvalue Problem -- 3.1.1 The Eigenvalue Problem for n=2 -- 3.1.2 The Eigenvalue

Problem for n3 -- 3.1.3 On Properties of Eigenvalues -- 3.2 The Nonlinear Eigenvalue Problem -- 4 Integral Inequalities -- 4.1 Classical Hardy Inequalities -- 4.2 The Friedrichs-Wirtinger Type Inequality -- 5 The Linear Oblique Derivative Problem for Elliptic Second Order Equation in a Domain with Conical Boundary Point -- 5.1 Preliminaries -- 5.2 Setting of the Problem -- 5.3 The Global Integral Weighted Estimate -- 5.4 Local Integral Weighted Estimates -- 5.5 The Power Modulus of Continuity -- 5.6 Examples -- 5.7 Notes -- 6 The Oblique Derivative Problem for Elliptic Second Order Semi-linear Equations in a Domain with a Conical Boundary Point -- 6.1 Setting of the Problem -- 6.2 Main Results -- 6.3 Global Integral Weighted Estimate -- 6.4 Local Integral Weighted Estimates.
6.5 Power Modulus of Continuity -- 7 Behavior of Weak Solutions to the Conormal Problem for Elliptic Weak Quasi-Linear Equations in a Neighborhood of a Conical Boundary Point -- 7.1 Setting of the Problem -- 7.2 The Maximum Principle -- 7.3 The Comparison Principle -- 7.4 The Barrier Function. The Preliminary Estimate of the Solution Modulus -- 7.5 Local Estimate at the Boundary -- 7.6 Global Integral Estimate -- 7.7 Local Integral Weighted Estimates -- 7.8 The Power Modulus of Continuity at the Conical Point for Weak Solutions -- 7.9 Example -- 7.10 Notes -- 8 Behavior of Strong Solutions to the Degenerate Oblique Derivative Problem for Elliptic Quasi-linear Equations in a Neighborhood of a Boundary Conical Point -- 8.1 Setting of the Problem -- 8.2 The Barrier Function. The Preliminary Estimate of the Solution Modulus -- 8.3 Integral Weighted Estimates -- 8.4 The Power Modulus of the Continuity at the Conical Point -- 8.5 Notes -- 9 The Oblique Derivative Problem in a Plane Sector for Elliptic Second Order Equation with Perturbed p(x)-Laplacian -- 9.1 Setting of the Problem -- 9.2 Preliminary -- 9.3 The Maximum Principle -- 9.4 The Comparison Principle -- 9.5 The Barrier Function. Estimation of the Solution Modulus -- 9.6 Proof of the Main Theorem 9.4 -- 10 The Oblique Derivative Problem in a Bounded n-Dimensional Cone for Strong Quasi-Linear Elliptic Second Order Equation with Perturbed p(x)-Laplacian -- 10.1 Setting of the Problem -- 10.2 Preliminary -- 10.3 The Maximum Principle -- 10.4 The Comparison Principle -- 10.5 The Barrier Function -- 10.6 Estimation of the Solution Modulus. The Proof of the Main Theorem 10.3 -- 11 Existence of Bounded Weak Solutions -- 11.1 Setting of the Problem -- 11.2 Proof of the Existence Theorem -- Bibliography -- Index -- Notation Index.

Sommario/riassunto

The aim of our book is the investigation of the behavior of strong and weak solutions to the regular oblique derivative problems for second order elliptic equations, linear and quasi-linear, in the neighborhood of the boundary singularities. The main goal is to establish the precise exponent of the solution decrease rate and under the best possible conditions. The question on the behavior of solutions of elliptic boundary value problems near boundary singularities is of great importance for its many applications, e.g., in hydrodynamics, aerodynamics, fracture mechanics, in the geodesy etc. Only few works are devoted to the regular oblique derivative problems for second order elliptic equations in non-smooth domains. All results are given with complete proofs. The monograph will be of interest to graduate students and specialists in elliptic boundary value problems and their applications.