Frontiers in Mathematics

Transmission Problems for Elliptic Second-Order Equations in Non-Smooth Domains

Bearbeitet von
Mikhail Borsuk

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Preface

The goal of this book is to investigate the behaviour of weak solutions to the elliptic transmisssion problem in a neighborhood of boundary singularities: angular and conic points or edges. We consider this problem both for linear and quasi-linear (very little studied) equations. In style and methods of research, this book is close to our monograph [14] together with Prof. V. Kondratiev.

The book consists of an Introduction, seven chapters, a Bibliography and Indexes. Chapter 1 is of auxiliary character. We recall the basic definitions and properties of Sobolev spaces and weighted Sobolev-Kondratiev spaces. Here we recall also the well-known Stampacchia's Lemma and derive a generalization for the solution of the Cauchy problem – the Gronwall-Chaplygin type inequality.

Chapter 2 deals with the eigenvalue problem for m-Laplace-Beltrami operator. By the variational principle we prove a new integro-differential Friedrichs-Wirtinger type inequality. This inequality is the basis for obtaining of precise exponents of the decreasing rate of the solution near boundary singularities.

Chapter 3 deals with the investigation of the transmission problem for linear elliptic second order equations in the domains with boundary conic point.

Chapter 4 is devoted to the transmission problem in conic domains with N different media for an equation with the Laplace operator in the principal part.

Chapters 5, 6 and 7 deal with the investigation of the transmission problem for quasi-linear elliptic second order equations in the domains with boundary conic point (Chapters 5–6) or with an edge at the boundary of a domain.

All results are given in the book with complete proofs. The book is based on the author's research he had made over the past years (see [8, 9, 10, 11, 12, 13]).

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