

CONTENTS

INTRODUCTION	1
CHAPTER I. THE FIRST BOUNDARY VALUE PROBLEM	15
1. Notation. Auxiliary results. Formulation of the first boundary value problem	15
2. A priori estimates in the spaces $\mathcal{L}_p(\Omega)$	22
3. Existence of a solution of the first boundary value problem in the spaces $\mathcal{L}_p(\Omega)$	25
4. Existence of a weak solution of the first boundary value problem in Hilbert space	28
5. Solution of the first boundary value problem by the method of elliptic regularization	30
6. Uniqueness theorems for weak solutions of the first boundary value problem	41
7. A lemma on nonnegative quadratic forms	64
8. On smoothness of weak solutions of the first boundary value problem. Conditions for existence of solutions with bounded derivatives	66
9. On conditions for the existence of a solution of the first boundary value problem in the spaces of S. L. Sobolev	102
CHAPTER II. ON THE LOCAL SMOOTHNESS OF WEAK SOLUTIONS AND HYPOELLIPTICITY OF SECOND ORDER DIFFERENTIAL EQUATIONS	114
1. The spaces \mathcal{H}_s	114
2. Some properties of pseudodifferential operators	125
3. A necessary condition for hypoellipticity	139
4. Sufficient conditions for local smoothness of weak solutions and hypoellipticity of differential operators	142
5. A priori estimates and hypoellipticity theorems for the operators of Hörmander	157

6. A priori estimates and hypoellipticity theorems for general second order differential equations	177
7. On the solution of the first boundary value problem in nonsmooth domains. The method of M. V. Keldyš	194
8. On hypoellipticity of second order differential operators with analytic coefficients	199
CHAPTER III. ADDITIONAL TOPICS	208
1. Qualitative properties of solutions of second order equations with non-negative characteristic form	208
2. The Cauchy problem for degenerating second order hyperbolic equations	220
3. Necessary conditions for correctness of the Cauchy problem for second order equations	237
BIBLIOGRAPHY	251