

CONTENTS

Translator's Preface	vii
Introduction.....	xiii
Chapter 1. Quasi-Reversibility and Equations of Parabolic Type	1
An Example	5
Heuristic Presentation of the Method of Quasi-Reversibility	8
Review of Equations of Evolution	12
General Problem	18
The QR Method	23
Examples	32
Numerical Applications for One-Dimensional Examples	35
Numerical Results	46
Stability of Numerical Integration Schemes for the Backward Parabolic System	51
Two-Dimensional Examples	59
Averaged Functionals	63
Equations with Time-Lag	81
Other Types of Equations	85
Chapter 2. Nonparabolic Equations of Evolution	111
Irreversible Operators and the QR Method	115
Numerical Applications: An Example Derived from Viscoelasticity	124
Coupled Problems of Evolution and the QR Method	130
Numerical Applications: Coupled Sound-Heat Equation	140
Transport Equations and the QR Method	158
Transport Equations: Numerical Applications	164
Chapter 3. Control in the Boundary Conditions.....	191
Equations of Parabolic Type.....	195
Formulation of Problem	195
Demonstration of Lemma 1	197

The Quasi-Reversibility Method	201
Remarks and Variants	208
Numerical Applications	215
Hyperbolic Equations of Evolution	220
Statement of the Problem	220
Results of Density and Nondensity	223
Sets of Uniqueness	227
The QR Method—First Possibility	229
The QR Method—Second Possibility: Method of Penalization	233
The QR Method—Third Possibility: Matrix Method	235
Numerical Results (I)	238
Numerical Results (II)	240
Chapter 4. Quasi-Reversibility and Analytic Continuation of Solutions of Elliptic Equations	251
Formulation of the Problem	254
Associated QR Problems	256
Convergence Theorems	259
Some Variants	268
Application to Harmonic Prolongation in an Annulus	270
Adaptation of the QR Method in the Case of a Singularity	276
Case of the Rectangle: Oscillatory Data and Logarithmic Singularity	280
Some Supplementary Remarks on Stabilization	286
Chapter 5. Quasi-Reversibility and Continuation of Solutions of Parabolic Equations	315
Formulation of the Problem	319
QR Problem Associated with Problem (I)	321
Convergence Theorem	323
Various Remarks	331
QR Problem Associated with Problem (II)	332
Further Examples	337
Numerical Applications (I)	339
Numerical Applications (II)	346
Problems with Singularities	348
Parabolic Problem in a Noncylindrical Domain	349
Chapter 6. Some Extensions	361
QR Method and Nonlinear Problems of Evolution	364

CONTENTS**xi**

Numerical Examples	372
Remarks on “Elliptic Continuation”	374
Problems with Constraints	376
Inverse Problems	379
Bibliography	385
Subject Index	389