

Contents

Introduction	1
Chapter 1. Parameter Identification in Linear Ordinary Differential Equations	5
1.1. Introduction	5
<u>1.2. Examples of inverse problems</u>	8
1.3. Appendix. Exponential of a square matrix	29
Chapter 2. Identification Problems in Hilbert Spaces	33
2.1. An identification problem related to a first-order differential equation	33
<u>2.2. Analysis of the dependence on the data of the solution $(\{y_n\}, \lambda)$ to problem (2.1.5), (2.1.6)</u>	36
2.3. The minimization method	39
<u>2.4. A further identification problem</u>	44
2.5. A generalization to the vector case	47
2.6. An identification problem for a second-order differential equation	50
Chapter 3. Proper Riemann Integrals for Banach-valued Functions. Curvilinear Integrals and Banach-valued Holomorphic Functions	57
3.1. Proper Riemann Integrals: basic properties	57

3.2. Curvilinear Integrals and Banach-valued Holomorphic Functions	63
Chapter 4. Riemann–Stieltjes Integrals of Banach-valued Functions	67
4.1. Riemann–Stieltjes integrals over compact intervals	67
Chapter 5. Improper Riemann Integrals for Banach Space-valued functions	83
5.1. Improper integrals	83
Chapter 6. Banach Algebras and Spectral Analysis for Linear Bounded Operators	91
6.1. Introduction	91
6.2. Basic properties of the spectrum of an element	93
6.3. Integration of Banach algebra-valued functions	97
6.4. Banach algebra-valued holomorphic functions and the spectral theorem	99
Chapter 7. Identifying Parameters in First-Order Partial Differential Equations	103
7.1. An identification problem relative to a first-order linear partial differential equation	103
7.2. An identification problem relative to a non-linear first-order partial differential equation.	107
Chapter 8. Identification Problems relative to Linear Bounded Operators I	113
8.1. An identification problem relative to a first-order differential equation	113
8.1.1. The singular case	117
8.1.2. The supersingular case	118
8.1.3. Continuous dependence on the data	118
8.2. An identification problem relative to a second-order differential equation	121

8.3. A particular case	124
8.4. An integro-differential identification problem	127
8.5. A onedimensional integro-differential identification problem	134
Chapter 9. Identification Problems Relative to Linear Bounded Operators II	139
9.1. An abstract control problem	139
9.2. A concrete example	141
Chapter 10. Analysis of the Continuous Dependence on the Data	149
10.1. Construction of an abstract model for the analysis of the continuous dependence on the data	149
10.2. Continuous dependence on the data of the solution to the identification problem (8.4.1)	152
10.3. Appendix. Gronwall's generalized inequality	158
Chapter 11. Linear Closed operators and Analytic Semigroups of Linear Bounded Operators	161
11.1. Linear closed operators	161
11.2. Resolvent set and spectrum of a linear operator	165
11.3. Sectorial operators	168
Chapter 12. Cauchy Problems for Linear Abstract Differential Equations Relative to Sectorial Operators and Applications	181
12.1. Abstract differential equations and analytic semigroups. Applications to Cauchy problems.	181
12.2. Applications	195
Chapter 13. Identification Problems for Linear Abstract Differential Equations Relative to Sectorial Operators and Applications	209
13.1. An abstract identification problem	209

13.2. An application to a concrete case	212
13.3. An identification problem relative to an abstract non-autonomous first-order differential equation	215
13.4. Analysis of a Cauchy problem with coefficients depending on time only	220
13.5. Analysis of a Cauchy problem with non-homogeneous boundary value conditions on a bounded interval	222
13.6. Solving the identification problem (13.3.1)–(13.3.4)	224

Bibliography**233****List of Symbols****237**