Wolfgang Arendt
Charles J.K. Batty
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Vector-valued Laplace Transforms and Cauchy Problems

Second Edition

Vectorvalued Laplace Transforms And Cauchy Problems

Giovanni Dore

Vectorvalued Laplace Transforms And Cauchy Problems:

Vector-Valued Laplace Transforms and Cauchy Problems Wolfgang Arendt,2001 Linear evolution equations in Banach spaces have seen important developments in the last two decades This is due to the many different applications in the theory of partial differential equations probability theory mathematical physics and other areas and also to the development of new techniques One important technique is given by the Laplace transform It played an important role in the early development of semigroup theory as can be seen in the pioneering monograph by Rille and Phillips HP57 But many new results and concepts have come from Laplace transform techniques in the last 15 years In contrast to the classical theory one particular feature of this method is that functions with values in a Banach space have to be considered The aim of this book is to present the theory of linear evolution equations in a systematic way by using the methods of vector valued Laplace transforms It is simple to describe the basic idea relating these two subjects Let A be a closed linear operator on a Banach space X The Cauchy problern defined by A is the initial value problern t 2 0 CP u t Au t u O x where x E X is a given initial value If u is an exponentially bounded continuous function then we may consider the Laplace transform 00 u 1 e tu t dt of u for large real *Vector-valued Laplace Transforms and Cauchy Problems* Wolfgang Arendt,Charles J.K. Batty,Matthias Hieber,Frank Neubrander,2011-04-05 This monograph gives a systematic account of the theory of vector valued Laplace transforms ranging from representation theory to Tauberian theorems In parallel the theory of linear Cauchy problems and semigroups of operators is developed completely in the spirit of Laplace transforms Existence and uniqueness regularity approximation and above all asymptotic behaviour of solutions are studied Diverse applications to partial differential equations are given The book contains an introduction to the Bochner integral and several appendices on background material It is addressed to students and researchers interested in evolution equations Laplace and Fourier transforms and functional analysis The second edition contains detailed notes on the developments in the last decade They include for instance a new characterization of well posedness of abstract wave equations in Hilbert space due to M Crouzeix Moreover new quantitative results on asymptotic behaviour of Laplace transforms have been added The references are updated and some errors have been corrected **Vector-Valued Laplace Transforms and Cauchy Problems** Wolfgang Arendt,Charles J. K. Batty,Matthias Hieber,2011-04-07 *Vector-valued Laplace Transforms and Cauchy Problems* Wolfgang Arendt,Charles J.K. Batty,Matthias Hieber,Frank Neubrander,2013-05-29 This monograph gives a systematic account of the theory of vector valued Laplace transforms ranging from representation theory to Tauberian theorems In parallel the theory of linear Cauchy problems and semigroups of operators is developed completely in the spirit of Laplace transforms Existence and uniqueness regularity approximation and above all asymptotic behaviour of solutions are studied Diverse applications to partial differential equations are given The book contains an introduction to the Bochner integral and several appendices on background material It is addressed to students and researchers interested in evolution equations Laplace and Fourier

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   Differential Equations in Banach Spaces Giovanni Dore,2020-10-07 This reference based on the Conference on Differential Equations held in Bologna provides information on current research in parabolic and hyperbolic differential equations Presenting methods and results in semigroup theory and their applications to evolution equations this book focuses on topics including abstract parabolic and hyperbolic linear differential equations nonlinear abstract parabolic equations holomorphic semigroups and Volterra operator integral equations With contributions from international experts Differential Equations in Banach Spaces is intended for research mathematicians in functional analysis partial differential equations operator theory and control theory and students in these disciplines   **The Cauchy Problem for Higher Order Abstract Differential Equations** Ti-Jun Xiao,Jin Liang,2013-12-11 The main purpose of this book is to present the basic theory and some recent de velopments concerning the Cauchy problem for higher order abstract differential equations u n t AiU i t 0 t 0

U k O Uk 0 k n l where AQ Ab A are linear operators in a topological vector space E n 1 Many problems in nature can be modeled as ACP For example many n initial value or initial boundary value problems for partial differential equations stemmed from mechanics physics engineering control theory etc can be trans lated into this form by regarding the partial differential operators in the space variables as operators Ai 0 i n 1 in some function space E and letting the boundary conditions if any be absorbed into the definition of the space E or of the domain of Ai this idea of treating initial value or initial boundary value problems was discovered independently by E Hille and K Yosida in the forties The theory of ACP is closely connected with many other branches of n mathematics Therefore the study of ACPn is important for both theoretical investigations and practical applications Over the past half a century ACP has been studied extensively *Almost Periodic and Almost Automorphic Solutions to Integro-Differential Equations* Marko Kostić,2019-05-06 This book discusses almost periodic and almost automorphic solutions to abstract integro differential Volterra equations that are degenerate in time and in particular equations whose solutions are governed by degenerate solution operator families with removable singularities at zero It particularly covers abstract fractional equations and inclusions with multivalued linear operators as well as abstract fractional semilinear Cauchy problems **Infinite Dimensional Dynamical Systems** John Mallet-Paret,Jianhong Wu,Huaiping Zhu,Yingfie Yi,2012-10-11 This collection covers a wide range of topics of infinite dimensional dynamical systems generated by parabolic partial differential equations hyperbolic partial differential equations solitary equations lattice differential equations delay differential equations and stochastic differential equations Infinite dimensional dynamical systems are generated by evolutionary equations describing the evolutions in time of systems whose status must be depicted in infinite dimensional phase spaces Studying the long term behaviors of such systems is important in our understanding of their spatiotemporal pattern formation and global continuation and has been among major sources of motivation and applications of new developments of nonlinear analysis and other mathematical theories Theories of the infinite dimensional dynamical systems have also found more and more important applications in physical chemical and life sciences This book collects 19 papers from 48 invited lecturers to the International Conference on Infinite Dimensional Dynamical Systems held at York University Toronto in September of 2008 As the conference was dedicated to Professor George Sell from University of Minnesota on the occasion of his 70th birthday this collection reflects the pioneering work and influence of Professor Sell in a few core areas of dynamical systems including non autonomous dynamical systems skew product flows invariant manifolds theory infinite dimensional dynamical systems approximation dynamics and fluid flows **$\mathcal {R}$-Boundedness, Fourier Multipliers and Problems of Elliptic and Parabolic Type** Robert Denk,Matthias Hieber,Jan Prüss,2003 The property of maximal L_p regularity for parabolic evolution equations is investigated via the concept of mathcal R sectorial operators and operator valued Fourier multipliers As application we consider the L_q realization of an elliptic boundary value problem of order 2m with operator valued coefficients subject to general boundary

conditions We show that there is maximal L_p L_q regularity for the solution of the associated Cauchy problem provided the top order coefficients are bounded and uniformly continuous **Impulsive Differential Inclusions** John R. Graef,Johnny Henderson,Abdelghani Ouahab,2013-07-31 Differential equations with impulses arise as models of many evolving processes that are subject to abrupt changes such as shocks harvesting and natural disasters These phenomena involve short term perturbations from continuous and smooth dynamics whose duration is negligible in comparison with the duration of an entire evolution In models involving such perturbations it is natural to assume these perturbations act instantaneously or in the form of impulses As a consequence impulsive differential equations have been developed in modeling impulsive problems in physics population dynamics ecology biotechnology industrial robotics pharmacokinetics optimal control and so forth There are also many different studies in biology and medicine for which impulsive differential equations provide good models During the last 10 years the authors have been responsible for extensive contributions to the literature on impulsive differential inclusions via fixed point methods This book is motivated by that research as the authors endeavor to bring under one cover much of those results along with results by other researchers either affecting or affected by the authors work The questions of existence and stability of solutions for different classes of initial value problems for impulsive differential equations and inclusions with fixed and variable moments are considered in detail Attention is also given to boundary value problems In addition since differential equations can be viewed as special cases of differential inclusions significant attention is also given to relative questions concerning differential equations This monograph addresses a variety of side issues that arise from its simpler beginnings as well **Perturbations of Positive Semigroups with Applications** Jacek Banasiak,Luisa Arlotti,2006-02-02 Perturbations of Positive Semigroups with Applications is a self contained introduction to semigroup theory with emphasis on positive semigroups on Banach lattices and perturbation techniques The first part of the book presents a survey of the results that are needed for the second applied part of the book worked examples are provided to help absorb the theoretical material The second part then deals with the application of the developed theory to a variety of problems ranging from the classical birth and death type problems of population dynamics through fragmentation models in both conservative and mass loss regimes to kinetic models The only prerequisites are a basic knowledge of functional analysis and measure theory This is an essential one stop reference for graduate and postgraduate students and researchers in applied analysis and mathematical physics who are interested in the application of functional analytic techniques to concrete problems arising in physics biology and engineering *Integro-Differential Equations* Mouffak Benchohra,Abdelkrim Salim,Yong Zhou,2024-08-19 This book delves into semilinear evolution equations impulsive differential equations and integro differential equations with different types of delay The main objective is to investigate the existence of solutions and explore their approximate controllability complete controllability and attractivity The study involves boundary conditions nonlocal conditions and impulsive conditions The analysis presented in this book goes beyond

traditional solutions and encompasses the study of solutions that are asymptotically almost automorphic and integro differential equations with impulsive effects in both bounded and unbounded domains The book also contains applications to nuclear physics elementary particle physics chemical engineering and economics This book is intended for researchers and professionals in the field of mathematics physics and industrial engineering as well as advanced graduate students

Bulletin of the Polish Academy of Sciences ,1998   *Differential and Integral Equations* ,2008   **Pacific Journal of Mathematics** ,2002   *Tokyo Journal of Mathematics* ,1992   Mathematica Montisnigri ,1999

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Table of Contents Vectorvalued Laplace Transforms And Cauchy Problems

1. Understanding the eBook Vectorvalued Laplace Transforms And Cauchy Problems
   - The Rise of Digital Reading Vectorvalued Laplace Transforms And Cauchy Problems
   - Advantages of eBooks Over Traditional Books
2. Identifying Vectorvalued Laplace Transforms And Cauchy Problems
   - Exploring Different Genres
   - Considering Fiction vs. Non-Fiction
   - Determining Your Reading Goals
3. Choosing the Right eBook Platform
   - Popular eBook Platforms
   - Features to Look for in an Vectorvalued Laplace Transforms And Cauchy Problems
   - User-Friendly Interface
4. Exploring eBook Recommendations from Vectorvalued Laplace Transforms And Cauchy Problems
   - Personalized Recommendations
   - Vectorvalued Laplace Transforms And Cauchy Problems User Reviews and Ratings
   - Vectorvalued Laplace Transforms And Cauchy Problems and Bestseller Lists
5. Accessing Vectorvalued Laplace Transforms And Cauchy Problems Free and Paid eBooks
   - Vectorvalued Laplace Transforms And Cauchy Problems Public Domain eBooks
   - Vectorvalued Laplace Transforms And Cauchy Problems eBook Subscription Services
   - Vectorvalued Laplace Transforms And Cauchy Problems Budget-Friendly Options
6. Navigating Vectorvalued Laplace Transforms And Cauchy Problems eBook Formats

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