Von Karman Evolution Equations Well Posedness And Long Time Dynamics 1st Edition

Dynamics of Evolutionary Equations Evolution Equations *Surface Evolution Equations* **Evolution Equations of Hyperbolic and Schrödinger Type** Leading-edge Research on Evolution Equations **Semilinear Evolution Equations and Their Applications** Dynamical Systems and Evolution Equations **Von Karman Evolution Equations** *Evolution Equations and Approximations* **Abstract Parabolic Evolution Equations and their Applications** Von Karman Evolution Equations **Evolution Equations, Semigroups and Functional Analysis Semigroup Methods for Evolution Equations on Networks Nonlinear Evolution Equations - Global Behavior of Solutions Evolution Equations in Thermoelasticity** *Evolution Equations in Scales of Banach Spaces* **Evolutionary Equations with Applications in Natural Sciences Nonlinear Evolution and Difference Equations of Monotone Type in Hilbert Spaces Evolution Equations and Lagrangian Coordinates Studies in Evolution Equations and Related Topics Evolution Equations in Scales of Banach Spaces** *Harmonic Analysis Method for Nonlinear Evolution Equations, I Beyond Partial Differential Equations* Evolution Equations And Approximations Harmonic Analysis Method for Nonlinear Evolution Equations, I **One-Parameter Semigroups for Linear Evolution Equations** *Nonlinear Evolution Equations and Dynamical Systems* Strong and Weak Approximation of Semilinear Stochastic Evolution

Equations **Progress in Evolution Equations** Focus on Evolution Equations **Evolution Equations, Semigroups and Functional Analysis** Evolution Equations *Linear and Quasi-linear Evolution Equations in Hilbert Spaces* **Moving Interfaces and Quasilinear Parabolic Evolution Equations Functional Analytic Methods for Evolution Equations** *Invariant Manifolds and Dispersive Hamiltonian Evolution Equations Spectral Theory, Mathematical System Theory, Evolution Equations, Differential and Difference Equations* **Fractional Evolution Equations and Inclusions** Evolution Equations *Evolutionary Equations*

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Evolution Equations in Scales of Banach Spaces Feb 09 2021

The book provides a new functional-analytic approach to evolution equations by considering the abstract Cauchy problem in a scale of Banach spaces. Conditions are proved characterizing well-posedness of the linear, time-dependent Cauchy problem in scales of Banach spaces and implying local existence, uniqueness, and regularity of solutions of the quasilinear Cauchy problem. Many applications illustrate the generality of the approach. In particular, using the Fefferman-Phong inequality unifying results on parabolic and hyperbolic equations generalizing classical ones and a unified treatment of Navier-Stokes and Euler equations is described. Assuming only basic knowledge in analysis and functional analysis the book provides all mathematical tools and is aimed for students, graduates, researchers, and lecturers.
Linear and Quasi-linear Evolution Equations in Hilbert Spaces Jan 28 2020 This book considers evolution equations of hyperbolic and parabolic type. These equations are studied from a common point of view, using elementary methods, such as that of energy estimates, which prove to be quite versatile. The authors emphasize the Cauchy problem and present a unified theory for the treatment of these equations. In particular, they provide local and global existence results, as well as strong well-posedness and asymptotic behavior results for the Cauchy problem for quasi-linear equations. Solutions of linear equations are constructed explicitly, using the Galerkin method; the linear theory is then applied to quasi-linear equations, by means of a linearization and fixed-point technique. The authors also compare hyperbolic and parabolic problems, both in terms of singular perturbations, on compact time intervals, and asymptotically, in terms of the diffusion phenomenon, with new results on decay estimates for strong solutions of homogeneous quasi-linear equations of each type. This textbook presents a valuable introduction to topics in the theory of evolution equations, suitable for advanced graduate students. The exposition is largely self-contained. The initial chapter reviews the essential material from functional analysis.

New ideas are introduced along with their context. Proofs are detailed and carefully presented. The book concludes with a chapter on applications of the theory to Maxwell's equations and von Karman's equations.

Dynamics of Evolutionary Equations Oct 29 2022 The theory and applications of infinite dimensional dynamical systems have attracted the attention of scientists for quite some time. This book serves as an entrée for scholars beginning their journey into the world of dynamical systems, especially infinite dimensional spaces. The main approach involves the theory of evolutionary equations.

Moving Interfaces and Quasilinear Parabolic Evolution Equations Dec 27 2019 In this monograph, the authors develop a comprehensive approach for the mathematical analysis of a wide array of problems involving moving interfaces. It includes an in-depth study of abstract quasilinear parabolic evolution equations, elliptic and parabolic boundary value problems, transmission problems, one- and two-phase Stokes problems, and the equations of incompressible viscous one- and two-phase fluid flows. The theory of maximal regularity, an essential element, is also fully developed. The authors present a modern approach based on powerful tools in classical analysis, functional analysis, and vector-valued harmonic analysis. The theory is applied to problems in two-phase fluid dynamics and phase transitions, one-phase generalized Newtonian fluids, nematic liquid crystal flows, Maxwell-Stefan diffusion, and a variety of geometric evolution equations. The book also includes a discussion of the underlying physical and thermodynamic principles governing the equations of fluid flows and phase transitions, and an exposition of the geometry of moving hypersurfaces.

Evolution Equations in Thermoelasticity Aug 15 2021 Although the study of classical thermoelasticity has provided information on linear systems, only recently have results on the asymptotic behavior completed our basic understanding of the

generic behavior of solutions. Through systematic work that began in the 80s, we now also understand the basic features of nonlinear systems. Yet some questions remain open, and the field has lacked a comprehensive survey that explores these past results and presents recent developments. Evolution Equations in Thermoelasticity presents a modern treatment of initial value problems and of initial boundary value problems in both linear and nonlinear thermoelasticity, in one- and multi-dimensional spatial configurations. The authors provide the first self-contained presentation of the subject that offers both introductory parts accessible to graduate students and sophisticated sections valuable to experts.

Evolutionary Equations Jun 20 2019 This open access book provides a solution theory for time-dependent partial differential equations, which classically have not been accessible by a unified method. Instead of using sophisticated techniques and methods, the approach is elementary in the sense that only Hilbert space methods and some basic theory of complex analysis are required. Nevertheless, key properties of solutions can be recovered in an elegant manner. Moreover, the strength of this method is demonstrated by a large variety of examples, showing the applicability of the approach of evolutionary equations in various fields. Additionally, a quantitative theory for evolutionary equations is developed. The text is self-contained, providing an excellent source for a first study on evolutionary equations and a decent guide to the available literature on this subject, thus bridging the gap to state-of-the-art mathematical research.

Surface Evolution Equations Aug 27 2022 This book presents a self-contained introduction to the analytic foundation of a level set approach for various surface evolution equations including curvature flow equations. These equations are important in many applications, such as material sciences, image processing and differential geometry. The goal is to introduce a generalized notion of solutions allowing singularities, and to solve the initial-

value problem globally-in-time in a generalized sense. Various equivalent definitions of solutions are studied. Several new results on equivalence are also presented. Moreover, structures of level set equations are studied in detail. Further, a rather complete introduction to the theory of viscosity solutions is contained, which is a key tool for the level set approach. Although most of the results in this book are more or less known, they are scattered in several references, sometimes without proofs. This book presents these results in a synthetic way with full proofs. The intended audience are graduate students and researchers in various disciplines who would like to know the applicability and detail of the theory as well as its flavour. No familiarity with differential geometry or the theory of viscosity solutions is required. Only prerequisites are calculus, linear algebra and some basic knowledge about semicontinuous functions.

Invariant Manifolds and Dispersive Hamiltonian Evolution Equations Oct 25 2019 The notion of an invariant manifold arises naturally in the asymptotic stability analysis of stationary or standing wave solutions of unstable dispersive Hamiltonian evolution equations such as the focusing semilinear Klein-Gordon and Schrodinger equations. This is due to the fact that the linearized operators about such special solutions typically exhibit negative eigenvalues (a single one for the ground state), which lead to exponential instability of the linearized flow and allows for ideas from hyperbolic dynamics to enter. One of the main results proved here for energy subcritical equations is that the center-stable manifold associated with the ground state appears as a hyper-surface which separates a region of finite-time blowup in forward time from one which exhibits global existence and scattering to zero in forward time. The authors' entire analysis takes place in the energy topology, and the conserved energy can exceed the ground state energy only by a small amount. This monograph is based on recent research by the authors. The proofs rely on an interplay between the variational structure of

the ground states and the nonlinear hyperbolic dynamics near these states. A key element in the proof is a virial-type argument excluding almost homoclinic orbits originating near the ground states, and returning to them, possibly after a long excursion. These lectures are suitable for graduate students and researchers in partial differential equations and mathematical physics. For the cubic Klein-Gordon equation in three dimensions all details are provided, including the derivation of Strichartz estimates for the free equation and the concentration-compactness argument leading to scattering due to Kenig and Merle.

Abstract Parabolic Evolution Equations and their Applications Jan 20 2022 This monograph is intended to present the fundamentals of the theory of abstract parabolic evolution equations and to show how to apply to various nonlinear dif- sion equations and systems arising in science. The theory gives us a uni?ed and s- tematic treatment for concrete nonlinear diffusion models. Three main approaches are known to the abstract parabolic evolution equations, namely, the semigroup methods, the variational methods, and the methods of using operational equations. In order to keep the volume of the monograph in reasonable length, we will focus on the semigroup methods. For other two approaches, see the related references in Bibliography. The semigroup methods, which go back to the invention of the analytic se- groups in the middle of the last century, are characterized by precise formulas representing the solutions of the Cauchy problem for evolution equations. The ?tA analytic semigroup e generated by a linear operator ?A provides directly a fundamental solution to the Cauchy problem for an autonomous linear e- dU lution equation, +AU =F(t), 0

Evolutionary Equations with Applications in Natural Sciences Jun 13 2021 With the unifying theme of abstract evolutionary equations, both linear and nonlinear, in a complex environment, the book presents a multidisciplinary blend of topics, spanning the fields of theoretical and applied functional

analysis, partial differential equations, probability theory and numerical analysis applied to various models coming from theoretical physics, biology, engineering and complexity theory. Truly unique features of the book are: the first simultaneous presentation of two complementary approaches to fragmentation and coagulation problems, by weak compactness methods and by using semigroup techniques, comprehensive exposition of probabilistic methods of analysis of long term dynamics of dynamical systems, semigroup analysis of biological problems and cutting edge pattern formation theory. The book will appeal to postgraduate students and researchers specializing in applications of mathematics to problems arising in natural sciences and engineering.

Spectral Theory, Mathematical System Theory, Evolution Equations, Differential and Difference Equations Sep 23 2019 The present volume contains a collection of original research articles and expository contributions on recent developments in operator theory and its multifaceted applications. They cover a wide range of themes from the IWOTA 2010 conference held at the TU Berlin, Germany, including spectral theory, function spaces, mathematical system theory, evolution equations and semigroups, and differential and difference operators. The book encompasses new trends and various modern topics in operator theory, and serves as a useful source of information to mathematicians, scientists and engineers.

Evolution Equations, Semigroups and Functional Analysis Mar 30 2020 Brunello Terreni (1953-2000) was a researcher and teacher with vision and dedication. The present volume is dedicated to the memory of Brunello Terreni. His mathematical interests are reflected in 20 expository articles written by distinguished mathematicians. The unifying theme of the articles is "evolution equations and functional analysis", which is presented in various and diverse forms: parabolic equations, semigroups, stochastic evolution, optimal control, existence,

uniqueness and regularity of solutions, inverse problems as well as applications. Contributors: P. Acquistapace, V. Barbu, A. Briani, L. Boccardo, P. Colli Franzone, G. Da Prato, D. Donatelli, A. Favini, M. Fuhrmann, M. Grasselli, R. Illner, H. Koch, R. Labbas, H. Lange, I. Lasiecka, A. Lorenzi, A. Lunardi, P. Marcati, R. Nagel, G. Nickel, V. Pata, M. M. Porzio, B. Ruf, G. Savaré, R. Schnaubelt, E. Sinestrari, H. Tanabe, H. Teismann, E. Terraneo, R. Triggiani, A. Yagi

Focus on Evolution Equations Apr 30 2020 This book presents high-quality research on the theory and methods of linear or non-linear evolution equations as well as their further applications. Equations dealing with the asymptotic behaviour of solutions to evolution equations are included. This book also covers degenerate parabolic equations, abstract differential equations, comments on the Schrodinger equation, solutions in banach spaces, periodic and quasi-periodic solutions, concave Lagragian systems and integral equations.

One-Parameter Semigroups for Linear Evolution Equations Sep 04 2020 This book explores the theory of strongly continuous one-parameter semigroups of linear operators. A special feature of the text is an unusually wide range of applications such as to ordinary and partial differential operators, to delay and Volterra equations, and to control theory. Also, the book places an emphasis on philosophical motivation and the historical background.

Evolution Equations in Scales of Banach Spaces Jul 14 2021 The book provides a new functional-analytic approach to evolution equations by considering the abstract Cauchy problem in a scale of Banach spaces. Conditions are proved characterizing well-posedness of the linear, time-dependent Cauchy problem in scales of Banach spaces and implying local existence, uniqueness, and regularity of solutions of the quasilinear Cauchy problem. Many applications illustrate the generality of the approach. In particular, using the Fefferman-Phong inequality unifying results

on parabolic and hyperbolic equations generalizing classical ones and a unified treatment of Navier-Stokes and Euler equations is described. Assuming only basic knowledge in analysis and functional analysis the book provides all mathematical tools and is aimed for students, graduates, researchers, and lecturers.

Evolution Equations of Hyperbolic and Schrödinger Type Jul 26 2022 Evolution equations of hyperbolic or more general p-evolution type form an active field of current research. This volume aims to collect some recent advances in the area in order to allow a quick overview of ongoing research. The contributors are first rate mathematicians. This collection of research papers is centred around parametrix constructions and microlocal analysis; asymptotic constructions of solutions; energy and dispersive estimates; and associated spectral transforms. Applications concerning elasticity and general relativity complement the volume. The book gives an overview of a variety of ongoing current research in the field and, therefore, allows researchers as well as students to grasp new aspects and broaden their understanding of the area.

Harmonic Analysis Method for Nonlinear Evolution Equations, I Oct 05 2020 This monograph provides a comprehensive overview on a class of nonlinear evolution equations, such as nonlinear Schrödinger equations, nonlinear Klein–Gordon equations, KdV equations as well as Navier–Stokes equations and Boltzmann equations. The global wellposedness to the Cauchy problem for those equations is systematically studied by using the harmonic analysis methods. This book is self-contained and may also be used as an advanced textbook by graduate students in analysis and PDE subjects and even ambitious undergraduate students. Contents:Fourier Multiplier, Function Spaces Xsp,qNavier–Stokes EquationStrichartz Estimates for Linear Dispersive EquationsLocal and Global Wellposedness for Nonlinear Dispersive EquationsThe Low Regularity Theory for the Nonlinear Dispersive EquationsFrequency-Uniform Decomposition

TechniquesConservations, Morawetz' Estimates of Nonlinear Schrödinger EquationsBoltzmann Equation without Angular Cutoff Readership: Graduate students and researchers interested in analysis and PDE. Keywords:Nonlinear Dispersive Equation;Harmonic Analysis MethodKey Features:From PDE point of view, this book gives a self-contained introduction to the theory of function spaces including Besov, modulation and Triebel–Lizorkin spacesThe main topics are concentrated in four kinds of important equations, nonlinear Schrödinger, Navier–Stokes, KdV and Boltzmann equationsThis monograph is a unique treatment of the frequency-uniform localization techniques for nonlinear evolution equationsReviews: "The book under review is well and clearly written and pleasant to read. It is aimed at advanced graduate students; hence, familiarity with basic topics in measure theory, real analysis, complex analysis, functional analysis, etc., is assumed on the part of the reader. Those mathematicians who wish to learn harmonic analysis methods used in PDEs, and who wish to enter into this active area of research, will surely find this book interesting. The book also contains a reasonably large bibliography." Mathematical Reviews

Von Karman Evolution Equations Dec 19 2021 In the study of mathematical models that arise in the context of concrete - plications, the following two questions are of fundamental importance: (i) we- posedness of the model, including existence and uniqueness of solutions; and (ii) qualitative properties of solutions. A positive answer to the ?rst question, - ing of prime interest on purely mathematical grounds, also provides an important test of the viability of the model as a description of a given physical phenomenon. An answer or insight to the second question provides a wealth of information about the model, hence about the process it describes. Of particular interest are questions related to long-time behavior of solutions. Such an evolution property cannot be v- i?ed empirically, thus any in a-priori information about the long-time asymptotics can be used in

predicting an ultimate long-time response and dynamical behavior of solutions. In recent years, this set of investigations has attracted a great deal of attention. Consequent efforts have then resulted in the creation and infusion of new methods and new tools that have been responsible for carrying out a successful an- ysis of long-time behavior of several classes of nonlinear PDEs.

Evolution Equations And Approximations Nov 06 2020 This book presents an approximation theory for a general class of nonlinear evolution equations in Banach spaces and the semigroup theory, including the linear (Hille–Yosida), nonlinear (Crandall–Liggett) and time-dependent (Crandall–Pazy) theorems. The implicit finite difference method of Euler is shown to generate a sequence convergent to the unique integral solution of evolution equations of the maximal monotone type. Moreover, the Chernoff theory provides a sufficient condition for consistent and stable time integration of time-dependent nonlinear equations. The Trotter–Kato theorem and the Lie–Trotter type product formula give a mathematical framework for the convergence analysis of numerical approximations of solutions to a general class of partial differential equations. This book contains examples demonstrating the applicability of the generation as well as the approximation theory. In addition, the Kobayashi–Oharu approach of locally quasi-dissipative operators is discussed for homogeneous as well as nonhomogeneous equations. Applications to the delay differential equations, Navier–Stokes equation and scalar conservation equation are given. Contents: Dissipative and Maximal Monotone OperatorsLinear SemigroupsAnalytic SemigroupsApproximation of C0-SemigroupsNonlinear Semigroups of ContractionsLocally Quasi-Dissipative Evolution EquationsThe Crandall–Pazy ClassVariational Formulations and Gelfand TriplesApplications to Concrete SystemsApproximation of Solutions for Evolution EquationsSemilinear Evolution EquationsAppendices:Some InequalitiesConvergence of Steklov

MeansSome Technical Results Needed in Section 9.2 Readership: Researchers in the fields of analysis & differential equations and approximation theory. Keywords:Evolution Equations;Approximations;Euler;Trotter-Kato;Lie-Trotter;Quasi-Dissipative Operators;K and Y Kobayashi;S OharuReviews:"Ito and Kappel offer a unified presentation of the general approach for well-posedness results using abstract evolution equations, drawing from and modifying the work of K and Y Kobayashi and S Oharu … their work is not a textbook, but they explain how instructors can use various sections, or combinations of them, as a foundation for a range of courses."Book News, Inc.

Semigroup Methods for Evolution Equations on Networks

Oct 17 2021 This concise text is based on a series of lectures held only a few years ago and originally intended as an introduction to known results on linear hyperbolic and parabolic equations. Yet the topic of differential equations on graphs, ramified spaces, and more general network-like objects has recently gained significant momentum and, well beyond the confines of mathematics, there is a lively interdisciplinary discourse on all aspects of so-called complex networks. Such network-like structures can be found in virtually all branches of science, engineering and the humanities, and future research thus calls for solid theoretical foundations. This book is specifically devoted to the study of evolution equations – i.e., of time-dependent differential equations such as the heat equation, the wave equation, or the Schrödinger equation (quantum graphs) – bearing in mind that the majority of the literature in the last ten years on the subject of differential equations of graphs has been devoted to elliptic equations and related spectral problems. Moreover, for tackling the most general settings - e.g. encoded in the transmission conditions in the network nodes - one classical and elegant tool is that of operator semigroups. This book is simultaneously a very concise introduction to this theory and a handbook on its applications to differential equations on networks. With a more interdisciplinary

readership in mind, full proofs of mathematical statements have been frequently omitted in favor of keeping the text as concise, fluid and self-contained as possible. In addition, a brief chapter devoted to the field of neurodynamics of the brain cortex provides a concrete link to ongoing applied research.

Beyond Partial Differential Equations Dec 07 2020 This book introduces the treatment of linear and nonlinear (quasi-linear) abstract evolution equations by methods from the theory of strongly continuous semigroups. The theoretical part is accessible to graduate students with basic knowledge in functional analysis, with only some examples requiring more specialized knowledge from the spectral theory of linear, self-adjoint operators in Hilbert spaces. Emphasis is placed on equations of the hyperbolic type which are less often treated in the literature.

Evolution Equations and Approximations Feb 21 2022 Annotation Ito (North Carolina State U.) and Kappel (U. of Graz, Austria) offer a unified presentation of the general approach for well-posedness results using abstract evolution equations, drawing from and modifying the work of K. and Y. Kobayashi and S. Oharu. They also explore abstract approximation results for evolution equations. Their work is not a textbook, but they explain how instructors can use various sections, or combinations of them, as a foundation for a range of courses. Annotation copyrighted by Book News, Inc., Portland, OR

Evolution Equations Sep 28 2022 Celebrating the work of renowned mathematician Jerome A. Goldstein, this reference compiles original research on the theory and application of evolution equations to stochastics, physics, engineering, biology, and finance. The text explores a wide range of topics in linear and nonlinear semigroup theory, operator theory, functional analysis, and li

Strong and Weak Approximation of Semilinear Stochastic Evolution Equations Jul 02 2020 In this book we analyze the error caused by numerical schemes for the approximation of semilinear

stochastic evolution equations (SEEq) in a Hilbert space-valued setting. The numerical schemes considered combine Galerkin finite element methods with Euler-type temporal approximations. Starting from a precise analysis of the spatio-temporal regularity of the mild solution to the SEEq, we derive and prove optimal error estimates of the strong error of convergence in the first part of the book. The second part deals with a new approach to the so-called weak error of convergence, which measures the distance between the law of the numerical solution and the law of the exact solution. This approach is based on Bismut's integration by parts formula and the Malliavin calculus for infinite dimensional stochastic processes. These techniques are developed and explained in a separate chapter, before the weak convergence is proven for linear SEEq.

Nonlinear Evolution and Difference Equations of Monotone Type in Hilbert Spaces May 12 2021 This book is devoted to the study of non-linear evolution and difference equations of first or second order governed by maximal monotone operator. This class of abstract evolution equations contains ordinary differential equations, as well as the unification of some important partial differential equations including heat equation, wave equation, Schrodinger equation, etc. The book contains a collection of the authors' work and applications in this field, as well as those of other authors.

Evolution Equations Feb 27 2020 The proceedings of a summer school held in 2015 whose theme was long time behavior and control of evolution equations.

Evolution Equations and Lagrangian Coordinates Apr 11 2021 The aim of the series is to present new and important developments in pure and applied mathematics. Well established in the community over two decades, it offers a large library of mathematics including several important classics. The volumes supply thorough and detailed expositions of the methods and ideas essential to the topics in question. In addition, they convey

their relationships to other parts of mathematics. The series is addressed to advanced readers wishing to thoroughly study the topic. Editorial Board Lev Birbrair, Universidade Federal do Ceará, Fortaleza, Brasil Victor P. Maslov, Russian Academy of Sciences, Moscow, Russia Walter D. Neumann, Columbia University, New York, USA Markus J. Pflaum, University of Colorado, Boulder, USA Dierk Schleicher, Jacobs University, Bremen, Germany

Functional Analytic Methods for Evolution Equations Nov 25 2019 This book consists of five introductory contributions by leading mathematicians on the functional analytic treatment of evolutions equations. In particular the contributions deal with Markov semigroups, maximal L^p-regularity, optimal control problems for boundary and point control systems, parabolic moving boundary problems and parabolic nonautonomous evolution equations. The book is addressed to PhD students, young researchers and mathematicians doing research in one of the above topics.

Nonlinear Evolution Equations - Global Behavior of Solutions Sep 16 2021

Leading-edge Research on Evolution Equations Jun 25 2022 This book presents high-quality research from around the world on the theory and methods of linear or nonlinear evolution equations as well as their further applications. Equations dealing with the asymptotic behavior of solutions to evolution equations are included. The book also covers degenerate parabolic equations, abstract differential equations, comments on the Schrodinger equation, solutions in banach spaces, periodic and quasi-periodic solutions, concave Lagragian systems and integral equations.

Evolution Equations, Semigroups and Functional Analysis Nov 18 2021 Brunello Terreni (1953-2000) was a researcher and teacher with vision and dedication. The present volume is dedicated to the memory of Brunello Terreni. His mathematical interests are reflected in 20 expository articles written by

distinguished mathematicians. The unifying theme of the articles is "evolution equations and functional analysis", which is presented in various and diverse forms: parabolic equations, semigroups, stochastic evolution, optimal control, existence, uniqueness and regularity of solutions, inverse problems as well as applications. Contributors: P. Acquistapace, V. Barbu, A. Briani, L. Boccardo, P. Colli Franzone, G. Da Prato, D. Donatelli, A. Favini, M. Fuhrmann, M. Grasselli, R. Illner, H. Koch, R. Labbas, H. Lange, I. Lasiecka, A. Lorenzi, A. Lunardi, P. Marcati, R. Nagel, G. Nickel, V. Pata, M. M. Porzio, B. Ruf, G. Savaré, R. Schnaubelt, E. Sinestrari, H. Tanabe, H. Teismann, E. Terraneo, R. Triggiani, A. Yagi.

Studies in Evolution Equations and Related Topics Mar 10 2021 This volume features recent development and techniques in evolution equations by renown experts in the field. Each contribution emphasizes the relevance and depth of this important area of mathematics and its expanding reach into the physical, biological, social, and computational sciences as well as into engineering and technology. The reader will find an accessible summary of a wide range of active research topics, along with exciting new results. Topics include: Impulsive implicit Caputo fractional q-difference equations in finite and infinite dimensional Banach spaces; optimal control of averaged state of a population dynamic model; structural stability of nonlinear elliptic p(u)-Laplacian problem with Robin-type boundary condition; exponential dichotomy and partial neutral functional differential equations, stable and center-stable manifolds of admissible class; global attractor in Alpha-norm for some partial functional differential equations of neutral and retarded type; and more. Researchers in mathematical sciences, biosciences, computational sciences and related fields, will benefit from the rich and useful resources provided. Upper undergraduate and graduate students may be inspired to contribute to this active and stimulating field.

Harmonic Analysis Method for Nonlinear Evolution Equations, I Jan 08 2021 1. Fourier multiplier, function space [symbol]. 1.1. Schwartz space, tempered distribution, Fourier transform. 1.2. Fourier multiplier on L[symbol]. 1.3. Dyadic decomposition, Besov and Triebel spaces. 1.4. Embeddings on X[symbol]. 1.5. Differential-difference norm on [symbol]. 1.6. Homogeneous space [symbol] 1.7. Bessel (Riesz) potential spaces [symbol]. 1.8. Fractional Gagliardo-Nirenberg inequalities -- 2. Navier-Stokes equation. 2.1. Introduction. 2.2. Time-space estimates for the heat semi-group. 2.3. Global well-posedness in L[symbol] of NS in 2D. 2.4. Well-posedness in L[symbol] of NS in higher dimensions. 2.5. Regularity of solutions for NS -- 3. Strichartz estimates for linear dispersive equations. 3.1. [symbol] estimates for the dispersive semi-group. 3.2. Strichartz inequalities : dual estimate techniques. 3.3. Strichartz estimates at endpoints -- 4. Local and global wellposedness for nonlinear dispersive equations. 4.1. Why is the Strichartz estimate useful. 4.2. Nonlinear mapping estimates in Besov spaces. 4.3. Critical and subcritical NLS in H[symbol]. 4.4. Global wellposedness of NLS in L[symbol] and H[symbol]. 4.5. Critical and subcritical NLKG in H[symbol]. 5. The low regularity theory for the nonlinear dispersive equations. 5.1. Bourgain space. 5.2. Local smoothing effect and maximal function estimates. 5.3. Bilinear estimates for KdV and local well-posedness. 5.4. Local well-posedness for KdV in H[symbol]. 5.5. I-method. 5.6. Schrodinger equation with derivative. 5.7. Some other dispersive equations -- 6. Frequency-uniform decomposition techniques. 6.1. Why does the frequency-uniform decomposition work. 6.2. Frequency-uniform decomposition, modulation spaces. 6.3. Inclusions between Besov and modulation spaces. 6.4. NLS and NLKG in modulation spaces. 6.5. Derivative nonlinear Schrodinger equations -- 7. Conservations, Morawetz' estimates of nonlinear Schrodinger equations. 7.1. Nother's theorem. 7.2. Invariance and conservation law. 7.3. Virial identity and Morawetz inequality. 7.4. Morawetz' interaction inequality. 7.5.

Scattering results for NLS -- 8. Boltzmann equation without angular cutoff. 8.1. Models for collisions in kinetic theory. 8.2. Basic surgery tools for the Boltzmann operator. 8.3. Properties of Boltzmann collision operator without cutoff. 8.4 Regularity of solutions for spatially homogeneous case

Dynamical Systems and Evolution Equations Apr 23 2022 This book grew out of a nine-month course first given during 1976-77 in the Division of Engineering Mechanics, University of Texas (Austin), and repeated during 1977-78 in the Department of Engineering Sciences and Applied Mathematics, Northwestern University. Most of the students were in their second year of graduate study, and all were familiar with Fourier series, Lebesgue integration, Hilbert space, and ordinary differential equa tions in finite-dimensional space. This book is primarily an exposition of certain methods of topological dynamics that have been found to be very useful in the analysis of physical systems but appear to be well known only to specialists. The purpose of the book is twofold: to present the material in such a way that the applications-oriented reader will be encouraged to apply these methods in the study of those physical systems of personal interest, and to make the coverage sufficient to render the current research literature intelligible, preparing the more mathematically inclined reader for research in this particular area of applied mathematics. We present only that portion of the theory which seems most useful in applications to physical systems. Adopting the view that the world is deterministic, we consider our basic problem to be predicting the future for a given physical system. This prediction is to be based on a known equation of evolution, describing the forward-time behavior of the system, but it is to be made without explicitly solving the equation.

Evolution Equations Jul 22 2019 This volume is a collection of notes from lectures given at the 2008 Clay Mathematics Institute Summer School, held in Zürich, Switzerland. The lectures were

designed for graduate students and mathematicians within five years of the Ph.D., and the main focus of the program was on recent progress in the theory of evolution equations. Such equations lie at the heart of many areas of mathematical physics and arise not only in situations with a manifest time evolution (such as linear and nonlinear wave and Schrödinger equations) but also in the high energy or semi-classical limits of elliptic problems. The three main courses focused primarily on microlocal analysis and spectral and scattering theory, the theory of the nonlinear Schrödinger and wave equations, and evolution problems in general relativity. These major topics were supplemented by several mini-courses reporting on the derivation of effective evolution equations from microscopic quantum dynamics; on wave maps with and without symmetries; on quantum N-body scattering, diffraction of waves, and symmetric spaces; and on nonlinear Schrödinger equations at critical regularity. Although highly detailed treatments of some of these topics are now available in the published literature, in this collection the reader can learn the fundamental ideas and tools with a minimum of technical machinery. Moreover, the treatment in this volume emphasizes common themes and techniques in the field, including exact and approximate conservation laws, energy methods, and positive commutator arguments. Titles in this series are co-published with the Clay Mathematics Institute (Cambridge, MA).

Nonlinear Evolution Equations and Dynamical Systems Aug 03 2020 Nonlinear Evolution Equations and Dynamical Systems (NEEDS) provides a presentation of the state of the art. Except for a few review papers, the 40 contributions are intentially brief to give only the gist of the methods, proofs, etc. including references to the relevant litera- ture. This gives a handy overview of current research activities. Hence, the book should be equally useful to the senior resercher as well as the colleague just entering the field. Keypoints treated are: i) integrable

systems in multidimensions and associated phenomenology ("dromions"); ii) criteria and tests of integrability (e.g., Painlev test); iii) new developments related to the scattering transform; iv) algebraic approaches to integrable systems and Hamiltonian theory (e.g., connections with Young-Baxter equations and Kac-Moody algebras); v) new developments in mappings and cellular automata, vi) applications to general relativity, condensed matter physics, and oceanography.

Progress in Evolution Equations Jun 01 2020 This book presents new research from around the world on the theory and methods of linear and non-linear evolution equations as well as their further applications. It includes the asymptotic behaviour of solutions to evolution equations. Other non-linear differential equations and applications to natural sciences are also included.

Semilinear Evolution Equations and Their Applications May 24 2022 This book, which is a continuation of Almost Automorphic Type and Almost Periodic Type Functions in Abstract Spaces, presents recent trends and developments upon fractional, first, and second order semilinear difference and differential equations, including degenerate ones. Various stability, uniqueness, and existence results are established using various tools from nonlinear functional analysis and operator theory (such as semigroup methods). Various applications to partial differential equations and the dynamic of populations are amply discussed. This self-contained volume is primarily intended for advanced undergraduate and graduate students, post-graduates and researchers, but may also be of interest to non-mathematicians such as physicists and theoretically oriented engineers. It can also be used as a graduate text on evolution equations and difference equations and their applications to partial differential equations and practical problems arising in population dynamics. For completeness, detailed preliminary background on Banach and Hilbert spaces, operator theory, semigroups of operators, and almost periodic functions and their spectral theory are included

as well.

Fractional Evolution Equations and Inclusions Aug 23 2019 Fractional evolution inclusions are an important form of differential inclusions within nonlinear mathematical analysis. They are generalizations of the much more widely developed fractional evolution equations (such as time-fractional diffusion equations) seen through the lens of multivariate analysis. Compared to fractional evolution equations, research on the theory of fractional differential inclusions is however only in its initial stage of development. This is important because differential models with the fractional derivative providing an excellent instrument for the description of memory and hereditary properties, and have recently been proved valuable tools in the modeling of many physical phenomena. The fractional order models of real systems are always more adequate than the classical integer order models, since the description of some systems is more accurate when the fractional derivative is used. The advantages of fractional derivatization become evident in modeling mechanical and electrical properties of real materials, description of rheological properties of rocks and in various other fields. Such models are interesting for engineers and physicists as well as so-called pure mathematicians. Phenomena investigated in hybrid systems with dry friction, processes of controlled heat transfer, obstacle problems and others can be described with the help of various differential inclusions, both linear and nonlinear. Fractional Evolution Equations and Inclusions is devoted to a rapidly developing area of the research for fractional evolution equations & inclusions and their applications to control theory. It studies Cauchy problems for fractional evolution equations, and fractional evolution inclusions with Hille-Yosida operators. It discusses control problems for systems governed by fractional evolution equations. Finally it provides an investigation of fractional stochastic evolution inclusions in Hilbert spaces. Systematic analysis of existence theory and topological structure

of solution sets for fractional evolution inclusions and control systems Differential models with fractional derivative provide an excellent instrument for the description of memory and hereditary properties, and their description and working will provide valuable insights into the modelling of many physical phenomena suitable for engineers and physicists The book provides the necessary background material required to go further into the subject and explore the rich research literature **Von Karman Evolution Equations** Mar 22 2022 In the study of mathematical models that arise in the context of concrete - plications, the following two questions are of fundamental importance: (i) we- posedness of the model, including existence and uniqueness of solutions; and (ii) qualitative properties of solutions. A positive answer to the ?rst question, - ing of prime interest on purely mathematical grounds, also provides an important test of the viability of the model as a description of a given physical phenomenon. An answer or insight to the second question provides a wealth of information about the model, hence about the process it describes. Of particular interest are questions related to long-time behavior of solutions. Such an evolution property cannot be v- i?ed empirically, thus any in a-priori information about the long-time asymptotics can be used in predicting an ultimate long-time response and dynamical behavior of solutions. In recent years, this set of investigations has attracted a great deal of attention. Consequent efforts have then resulted in the creation and infusion of new methods and new tools that have been responsible for carrying out a successful an- ysis of long-time behavior of several classes of nonlinear PDEs.