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

Dispersive Partial Differential Equations **Progress in Partial Differential Equations Well-posedness of the Three-dimensional Lagrangian Averaged Navier-Stokes Equations Global Well-posedness of Nonlinear Parabolic-Hyperbolic Coupled Systems** *Harmonic Analysis Method for Nonlinear Evolution Equations, I* **Well-Posedness of Parabolic Difference Equations Local Well-Posedness and Break-Down Criterion of the Incompressible Euler Equations with Free Boundary** *Well-posedness of the initial value problem for the Navier-Stokes equations in two dimensions in some intermediate spaces Von Karman Evolution Equations* **Well-Posedness of Parabolic Difference Equations** *Local and Global Well-posedness of Compressible Navier-Stokes Equations Inverse and Ill-Posed Problems* **Stochastic Partial Differential Equations and Related Fields Inverse and Ill-posed Problems** *Complete Second Order Linear Differential Equations in Hilbert Spaces Well-posed, Ill-posed, and Intermediate Problems with Applications* **Parabolic Equations with Irregular Data and Related Issues** *Well-posedness of Parabolic Difference Equations Recent Developments in Well-Posed Variational Problems* Initial-Boundary Value Problems and the Navier-Stokes Equation **Methods for Partial Differential Equations** *Nonlinear Dispersive Partial Differential Equations and Inverse Scattering* **The Mathematical Analysis of the Incompressible Euler and Navier-Stokes Equations** Well-posedness for the Navier-Stokes Equations *On Well-posedness and Ill-posedness in Case of Differential-algebraic Equations* **Some Problems on Nonlinear Hyperbolic Equations and Applications General Parabolic Mixed Order Systems in Lp and Applications On Well-posedness and Ill-posedness in Case of Differential-algebraic Equations Symposium on Non-Well-Posed Problems and Logarithmic Convexity Anomalies in Partial Differential Equations Well-Posed Optimization Problems Mathematical Theory of Evolutionary Fluid-Flow Structure Interactions On Well-posedness of Generalized Surface Quasi-geostrophic Equations in Critical Sobolev Spaces Improperly Posed Problems in Partial Differential Equations** *Well-posedness of the Nonlinear Equations for Zero Mach Number Combustion* Well-posedness of One-way Wave Equations and Absorbing Boundary Conditions Regularization for Applied Inverse and Ill-Posed Problems **Well Posedness Results for a Class of Partial Differential Equations with Hysteresis Arising in Electromagnetism A Primer for a Secret Shortcut to PDEs of Mathematical Physics Identification Problems of Wave Phenomena**

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On Well-posedness and Ill-posedness in Case of Differential-algebraic Equations Jul 10 2020

A Primer for a Secret Shortcut to PDEs of Mathematical Physics Jul 30 2019 This book presents a concise introduction to a unified Hilbert space approach to the mathematical modelling of physical phenomena which has been developed over recent years by Picard and his co-workers. The main focus is on time-dependent partial differential equations with a particular structure in the Hilbert space setting that ensures well-posedness and causality, two essential properties of any reasonable model in mathematical physics or engineering.However, the application of the theory to other types of equations is also demonstrated. By means of illustrative examples, from the straightforward to the more complex, the authors show that many of the classical models in mathematical physics as well as more recent models of novel materials and interactions are covered, or can be restructured to be covered, by this unified Hilbert space approach. The reader should require only a basic foundation in the theory of Hilbert spaces and operators therein. For convenience, however, some of the more technical background requirements are covered in detail in two appendices The theory is kept as elementary as possible, making the material suitable for a senior undergraduate or master's level course. In addition, researchers in a variety of fields whose work involves partial differential equations and applied operator theory will also greatly benefit from this approach to structuring their mathematical models in order that the general theory can be applied to ensure the essential properties of well-posedness and causality.

Initial-Boundary Value Problems and the Navier-Stokes Equation Mar 18 2021 Initial-Boundary Value Problems and the Navier-Stokes Equations gives an introduction to the vast subject of initial and initial-boundary value problems for PDEs. Applications to parabolic and hyperbolic systems are emphasized in this text. The Navier-Stokes equations for compressible and incompressible flows are taken as an example to illustrate the results. The subjects addressed in the book, such as the well-posedness of initial-boundary value problems, are of frequent interest when PDEs are used in modeling or when they are solved numerically. The book explains the principles of these subjects. The reader will learn what well-posedness or ill-posedness means and how it can be demonstrated for concrete problems. Audience: when the book was written, the main intent was to write a text on initial-boundary value problems that was accessible to a rather wide audience. Functional analytical prerequisites were kept to a minimum or were developed in the book. Boundary conditions are analyzed without first proving trace theorems, and similar simplifications have been used throughout. This book continues to be useful to researchers and graduate students in applied mathematics and engineering.

Progress in Partial Differential Equations Oct 05 2022 Progress in Partial Differential Equations is devoted to modern topics in the theory of partial differential equations. It consists of both original articles and survey papers covering a wide scope of research topics in partial differential equations and their applications. The contributors were participants of the 8th ISAAC congress in Moscow in 2011 or are members of the PDE interest group of the ISAAC society. This volume is addressed to graduate students at various levels as well as researchers in partial differential equations and related fields. The readers will find this an excellent resource of both introductory and advanced material. The key topics are: • Linear hyperbolic equations and systems (scattering, symmetrisers) • Non-linear wave models (global existence, decay estimates, blow-up) • Evolution equations (control theory, well-posedness, smoothing) • Elliptic equations (uniqueness, non-uniqueness, positive solutions) • Special models from applications (Kirchhoff equation, Zakharov-Kuznetsov equation, thermoelasticity)

On Well-posedness of Generalized Surface Quasi-geostrophic Equations in Critical Sobolev Spaces Feb 03 2020 The generalized surface quasi-geostrophic equations (gSQG) is a family of active scalar transport equations that interpolates between the 2D incompressible Euler equation and the surface quasi-geostrophic (SQG) equation and extrapolates beyond the SQG to increasingly singular constitutive laws. This dissertation consists of two studies surrounding the gSQG family. In one, we study dissipative perturbations of the gSQG equation in the most singular regime of the constitutive law, i.e., where the order of the fractional dissipation is small relative to the order of advecting velocity, and the velocity is less regular than the advected scalar by up to one order of derivative. In this regime, we establish the existence of a local-in-time unique solution at critical Sobolev regularity. Under the assumption of small initial data, we show these solutions are global. Furthermore, we prove that the solution belongs to a sub-analytic Gevery class up to the maximal time of existence. In the second study, we

consider an inviscid counterpart of the gSQG equation where the constitutive law has been mildly regularized by a logarithm in its most singular regime. With this modification, we establish well-posedness in the sense of Hadamard at borderline Sobolev regularity, i.e., we prove the existence of a unique solution and continuity of the corresponding flow map. To prove these results, we develop apriori estimates for a novel approximation scheme that preserves the underlying commutator structure of the equations. These results appear to be the first of their kind for a quasilinear parabolic equation whose coefficients are of a higher order than the linear term.

Complete Second Order Linear Differential Equations in Hilbert Spaces Aug 23 2021 Incomplete second order linear differential equations in Banach spaces as well as first order equations have become a classical part of functional analysis. This monograph is an attempt to present a unified systematic theory of second order equations y" (t) + Ay' (t) + By (t) = 0 including well-posedness of the Cauchy problem as well as the Dirichlet and Neumann problems. Exhaustive yet clear answers to all posed questions are given. Special emphasis is placed on new surprising effects arising for complete second order equations which do not take place for first order and incomplete second order equations. For this purpose, some new results in the spectral theory of pairs of operators and the boundary behavior of integral transforms have been developed. The book serves as a self-contained introductory course and a reference book on this subject for undergraduate and post- graduate students and research mathematicians in analysis. Moreover, users will welcome having a comprehensive study of the equations at hand, and it gives insight into the theory of complete second order linear differential equations in a general context - a theory which is far from being fully understood.

Methods for Partial Differential Equations Feb 14 2021 This book provides an overview of different topics related to the theory of partial differential equations. Selected exercises are included at the end of each chapter to prepare readers for the “research project for beginners” proposed at the end of the book. It is a valuable resource for advanced graduates and undergraduate students who are interested in specializing in this area. The book is organized in five parts: In Part 1 the authors review the basics and the mathematical prerequisites, presenting two of the most fundamental results in the theory of partial differential equations: the Cauchy-Kovalevskaja theorem and Holmgren's uniqueness theorem in its classical and abstract form. It also introduces the method of characteristics in detail and applies this method to the study of Burger's equation. Part 2 focuses on qualitative properties of solutions to basic partial differential equations, explaining the usual properties of solutions to elliptic, parabolic and hyperbolic equations for the archetypes Laplace equation, heat equation and wave equation as well as the different features of each theory. It also discusses the notion of energy of solutions, a highly effective tool for the treatment of non-stationary or evolution models and shows how to define energies for different models. Part 3 demonstrates how phase space analysis and interpolation techniques are used to prove decay estimates for solutions on and away from the conjugate line. It also examines how terms of lower order (mass or dissipation) or additional regularity of the data may influence expected results. Part 4 addresses semilinear models with power type non-linearity of source and absorbing type in order to determine critical exponents: two well-known critical exponents, the Fujita exponent and the Strauss exponent come into play. Depending on concrete models these critical exponents divide the range of admissible powers in classes which make it possible to prove quite different qualitative properties of solutions, for example, the stability of the zero solution or blow-up behavior of local (in time) solutions. The last part features selected research projects and general background material.

Well-Posedness of Parabolic Difference Equations Jun 01 2022 A well-known and widely applied method of approximating the solutions of problems in mathematical physics is the method of difference schemes. Modern computers allow the implementation of highly accurate ones; hence, their construction and investigation for various boundary value problems in mathematical physics is generating much current interest. The present monograph is devoted to the construction of highly accurate difference schemes for parabolic boundary value problems, based on Padé approximations. The investigation is based on a new notion of positivity of difference operators in Banach spaces, which allows one to deal with difference schemes of arbitrary order of accuracy. Establishing coercivity inequalities allows one to obtain sharp, that is, two-sided estimates of convergence rates. The proofs are based on results in interpolation theory of linear operators. This monograph will be of value to professional mathematicians as well as advanced students interested in the fields of functional analysis and partial differential equations.

The Mathematical Analysis of the Incompressible Euler and Navier-Stokes Equations Dec 15 2020 The aim of this book is to provide beginning graduate students who completed the first two semesters of graduate-level analysis and PDE courses with a first exposure to the mathematical analysis of the incompressible Euler and Navier-Stokes equations. The book gives a concise introduction to the fundamental results in the well-posedness theory of these PDEs, leaving aside some of the technical challenges presented by bounded domains or by intricate functional spaces. Chapters 1 and 2 cover the fundamentals of the Euler theory: derivation, Eulerian and Lagrangian perspectives, vorticity, special solutions, existence theory for smooth solutions, and blowup criteria. Chapters 3, 4, and 5 cover the fundamentals of the Navier-Stokes theory: derivation, special solutions, existence theory for strong solutions, Leray theory of weak solutions, weak-strong uniqueness, existence theory of mild solutions, and Prodi-Serrin regularity criteria. Chapter 6 provides a short guide to the must-read topics, including active research directions, for an advanced graduate student working in incompressible fluids. It may be used as a roadmap for a topics course in a subsequent semester. The appendix recalls basic results from real, harmonic, and functional analysis. Each chapter concludes with exercises, making the text suitable for a one-semester graduate course. Prerequisites to this book are the first two semesters of graduate-level analysis and PDE courses.

Global Well-posedness of Nonlinear Parabolic-Hyperbolic Coupled Systems Aug 03 2022 This book presents recent results on nonlinear parabolic-hyperbolic coupled systems such as the compressible Navier-Stokes equations, and liquid crystal system. It summarizes recently published research by the authors and their collaborators, but also includes new and unpublished material. All models under consideration are built on compressible equations and liquid crystal systems. This type of partial differential equations arises not only in many fields of mathematics, but also in other branches of science such as physics, fluid dynamics and material science.

Well-posed, Ill-posed, and Intermediate Problems with Applications Jul 22 2021 This book deals with one of the key problems in applied mathematics, namely the investigation into and providing for solution stability in solving equations with due allowance for inaccuracies in set initial data, parameters and coefficients of a mathematical model for an object under study, instrumental function, initial conditions, etc., and also with allowance for miscalculations, including roundoff errors. Until recently, all problems in mathematics, physics and engineering were divided into two classes: well-posed problems and ill-posed problems. The authors introduce a third class of problems: intermediate ones, which are problems that change their property of being well- or ill-posed on equivalent transformations of governing equations, and also problems that display the property of being either well- or ill-posed depending on the type of the functional space used. The book is divided into two parts: Part one deals with general properties of all three classes of mathematical, physical and engineering problems with approaches to solve them; Part two deals with several stable models for solving inverse ill-posed problems, illustrated with numerical examples.

Well-Posed Optimization Problems Apr 06 2020 This book presents in a unified way the mathematical theory of well-posedness in optimization. The basic concepts of well-posedness and the links among them are studied, in particular Hadamard and Tykhonov well-posedness. Abstract optimization problems as well as applications to optimal control, calculus of variations and mathematical programming are considered. Both the pure and applied side of these topics are presented. The main subject is often introduced by heuristics, particular cases and examples. Complete proofs are provided. The expected knowledge of the reader does not extend beyond textbook (real and functional) analysis, some topology and differential equations and basic optimization. References are provided for more advanced topics. The book is addressed to mathematicians interested in optimization and related topics, and also to engineers, control theorists, economists and applied scientists who can find here a mathematical justification of practical procedures they encounter.

General Parabolic Mixed Order Systems in Lp and Applications Aug 11 2020 In this text, a theory for general linear parabolic partial differential equations is established which covers equations with inhomogeneous symbol structure as well as mixed-order systems. Typical applications include several variants of the Stokes system and free boundary value problems. We show well-posedness in Lp-Lq-Sobolev spaces in time and space for the linear problems (i.e., maximal

regularity) which is the key step for the treatment of nonlinear problems. The theory is based on the concept of the Newton polygon and can cover equations which are not accessible by standard methods as, e.g., semigroup theory. Results are obtained in different types of non-integer Lp-Sobolev spaces as Besov spaces, Bessel potential spaces, and Triebel–Lizorkin spaces. The last-mentioned class appears in a natural way as traces of Lp-Lq-Sobolev spaces. We also present a selection of applications in the whole space and on half-spaces. Among others, we prove well-posedness of the linearizations of the generalized thermoelastic plate equation, the two-phase Navier–Stokes equations with Boussinesq–Scriven surface, and the Lp-Lq two-phase Stefan problem with Gibbs–Thomson correction.

Local and Global Well-posedness of Compressible Navier-Stokes Equations Dec 27 2021

Well-posedness of One-way Wave Equations and Absorbing Boundary Conditions Nov 01 2019

Well-posedness of the Nonlinear Equations for Zero Mach Number Combustion Dec 03 2019

Local Well-Posedness and Break-Down Criterion of the Incompressible Euler Equations with Free Boundary Apr 30 2022 In this paper, we prove the local well-posedness of the free boundary problem for the incompressible Euler equations in low regularity Sobolev spaces, in which the velocity is a Lipschitz function and the free surface belongs to C 3 2 +ε. Moreover, we also present a Beale-Kato-Majda type break-down criterion of smooth solution in terms of the mean curvature of the free surface, the gradient of the velocity and Taylor sign condition.

Symposium on Non-Well-Posed Problems and Logarithmic Convexity Jun 08 2020

Stochastic Partial Differential Equations and Related Fields Oct 25 2021 This Festschrift contains five research surveys and thirty-four shorter contributions by participants of the conference ''Stochastic Partial Differential Equations and Related Fields'' hosted by the Faculty of Mathematics at Bielefeld University, October 10–14, 2016. The conference, attended by more than 140 participants, including PostDocs and PhD students, was held both to honor Michael Röckner's contributions to the field on the occasion of his 60th birthday and to bring together leading scientists and young researchers to present the current state of the art and promising future developments. Each article introduces a well-described field related to Stochastic Partial Differential Equations and Stochastic Analysis in general. In particular, the longer surveys focus on Dirichlet forms and Potential theory, the analysis of Kolmogorov operators, Fokker–Planck equations in Hilbert spaces, the theory of variational solutions to stochastic partial differential equations, singular stochastic partial differential equations and their applications in mathematical physics, as well as on the theory of regularity structures and paracontrolled distributions. The numerous research surveys make the volume especially useful for graduate students and researchers who wish to start work in the above-mentioned areas, or who want to be informed about the current state of the art.

Parabolic Equations with Irregular Data and Related Issues Jun 20 2021 This book studies the existence and uniqueness of solutions to parabolic-type equations with irregular coefficients and/or initial conditions. It elaborates on the DiPerna-Lions theory of renormalized solutions to linear transport equations and related equations, and also examines the connection between the results on the partial differential equation and the well-posedness of the underlying stochastic/ordinary differential equation.

Well-posedness of Parabolic Difference Equations May 20 2021 A well-known and widely applied method of approximating the solutions of problems in mathematical physics is the method of difference schemes. Modern computers allow the implementation of highly accurate ones; hence, their construction and investigation for various boundary value problems in mathematical physics is generating much current interest. The present monograph is devoted to the construction of highly accurate difference schemes for parabolic boundary value problems, based on PadA(c) approximations. The investigation is based on a new notion of positivity of difference operators in Banach spaces, which allows one to deal with difference schemes of arbitrary order of accuracy. Establishing coercivity inequalities allows one to obtain sharp, that is, two-sided estimates of convergence rates. The proofs are based on results in interpolation theory of linear operators. This monograph will be of value to professional mathematicians as well as advanced students interested in the fields of functional analysis and partial differential equations.

Nonlinear Dispersive Partial Differential Equations and Inverse Scattering Jan 16 2021 This volume contains lectures and invited papers from the Focus Program on "Nonlinear Dispersive Partial Differential Equations and Inverse Scattering" held at the Fields Institute from July 31-August 18, 2017. The conference brought together researchers in completely integrable systems and PDE with the goal of advancing the understanding of qualitative and long-time behavior in dispersive nonlinear equations. The program included Percy Deift's Coxeter lectures, which appear in this volume together with tutorial lectures given during the first week of the focus program. The research papers collected here include new results on the focusing nonlinear Schrödinger (NLS) equation, the massive Thirring model, and the Benjamin-Bona-Mahoney equation as dispersive PDE in one space dimension, as well as the Kadomtsev-Petviashvili II equation, the Zakharov-Kuznetsov equation, and the Gross-Pitaevskii equation as dispersive PDE in two space dimensions. The Focus Program coincided with the fiftieth anniversary of the discovery by Gardner, Greene, Kruskal and Miura that the Korteweg-de Vries (KdV) equation could be integrated by exploiting a remarkable connection between KdV and the spectral theory of Schrodinger's equation in one space dimension. This led to the discovery of a number of completely integrable models of dispersive wave propagation, including the cubic NLS equation, and the derivative NLS equation in one space dimension and the Davey-Stewartson, Kadomtsev-Petviashvili and Novikov-Veselov equations in two space dimensions. These models have been extensively studied and, in some cases, the inverse scattering theory has been put on rigorous footing. It has been used as a powerful analytical tool to study global well-posedness and elucidate asymptotic behavior of the solutions, including dispersion, soliton resolution, and semiclassical limits.

Anomalies in Partial Differential Equations May 08 2020 The contributions contained in the volume, written by leading experts in their respective fields, are expanded versions of talks given at the INDAM Workshop "Anomalies in Partial Differential Equations" held in September 2019 at the Istituto Nazionale di Alta Matematica, Dipartimento di Matematica "Guido Castelnuovo", Università di Roma "La Sapienza". The volume contains results for well-posedness and local solvability for linear models with low regular coefficients. Moreover, nonlinear dispersive models (damped waves, p-evolution models) are discussed from the point of view of critical exponents, blow-up phenomena or decay estimates for Sobolev solutions. Some contributions are devoted to models from applications as traffic flows, Einstein-Euler systems or stochastic PDEs as well. Finally, several contributions from Harmonic and Time-Frequency Analysis, in which the authors are interested in the action of localizing operators or the description of wave front sets, complete the volume.

Inverse and Ill-posed Problems Sep 23 2021 The text demonstrates the methods for proving the existence (if at all) and finding of inverse and ill-posed problems solutions in linear algebra, integral and operator equations, integral geometry, spectral inverse problems, and inverse scattering problems. It is given comprehensive background material for linear ill-posed problems and for coefficient inverse problems for hyperbolic, parabolic, and elliptic equations. A lot of examples for inverse problems from physics, geophysics, biology, medicine, and other areas of application of mathematics are included.

Dispersive Partial Differential Equations Nov 06 2022 Introduces nonlinear dispersive partial differential equations in a detailed yet elementary way without compromising the depth and richness of the subject.

Well-Posedness of Parabolic Difference Equations Jan 28 2022 A well-known and widely applied method of approximating the solutions of problems in mathematical physics is the method of difference schemes. Modern computers allow the implementation of highly accurate ones; hence, their construction and investigation for various boundary value problems in mathematical physics is generating much current interest. The present monograph is devoted to the construction of highly accurate difference schemes for parabolic boundary value problems, based on Padé approximations. The investigation is based on a new notion of positivity of difference operators in Banach spaces, which allows one to deal with difference schemes of arbitrary order of accuracy. Establishing coercivity inequalities allows one to obtain sharp, that is, two-sided estimates of convergence rates. The proofs are based on results in interpolation theory of linear operators. This monograph will be of value to professional mathematicians as well as advanced students interested in the fields of functional analysis and partial differential equations.

On Well-posedness and Ill-posedness in Case of Differential-algebraic Equations Oct 13 2020

Identification Problems of Wave Phenomena Jun 28 2019 The

Inverse and Ill-Posed Problems Series is a series of monographs publishing postgraduate level information on inverse and ill-posed problems for an international readership of professional scientists and researchers. The series aims to publish works which involve both theory and applications in, e.g., physics, medicine, geophysics, acoustics, electrodynamics, tomography, and ecology.

Well Posedness Results for a Class of Partial Differential Equations with Hysteresis Arising in Electromagnetism Aug 30 2019

Improperly Posed Problems in Partial Differential Equations Jan 04 2020 A discussion of improperly posed Cauchy problems in partial differential equations

Well-posedness of the Three-dimensional Lagrangian Averaged Navier-Stokes Equations Sep 04 2022

Von Karman Evolution Equations Feb 26 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.

Regularization for Applied Inverse and Ill-Posed Problems Oct 01 2019

Well-posedness for the Navier-Stokes Equations Nov 13 2020

Inverse and Ill-Posed Problems Nov 25 2021 Inverse and Ill-Posed Problems is a collection of papers presented at a seminar of the same title held in Austria in June 1986. The papers discuss inverse problems in various disciplines; mathematical solutions of integral equations of the first kind; general considerations for ill-posed problems; and the various regularization methods for integral and operator equations of the first kind. Other papers deal with applications in tomography, inverse scattering, detection of radiation sources, optics, partial differential equations, and parameter estimation problems. One paper discusses three topics on ill-posed problems, namely, the imposition of specified types of discontinuities on solutions of ill-posed problems, the use of generalized cross validation as a data based termination rule for iterative methods, and also a parameter estimation problem in reservoir modeling. Another paper investigates a statistical method to determine the truncation level in Eigen function expansions and for Fredholm equations of the first kind where the data contains some errors. Another paper examines the use of singular function expansions in the inversion of severely ill-posed problems arising in confocal scanning microscopy, particle sizing, and velocimetry. The collection can benefit many mathematicians, students, and professor of calculus, statistics, and advanced mathematics.

Recent Developments in Well-Posed Variational Problems Apr 18 2021 The increasing complexity of mathematical models, and the related need to introduce simplifying assumptions and numerical approximations, has led to the need to consider approximate solutions. When dealing with any mathematical model, some of the basic questions to be asked are whether the solution is stable to perturbations, what the approximate solutions are, and if the set of approximate solutions is close to the original solution set. The interrelationships between these aspects are also of theoretical interest. Such concepts are described in the present volume, which emphasizes the concepts of approximate solution, well-posedness and stability in optimization, calculus of variations, optimal control, and the mathematics of conflict (e.g. game theory and vector optimization). The most recent developments are covered. Audience: Researchers and graduate students studying variational problems, nonlinear analysis, optimization, and game theory.

Well-posedness of the initial value problem for the Navier-Stokes equations in two dimensions in some intermediate spaces Mar 30 2022

Some Problems on Nonlinear Hyperbolic Equations and Applications Sep 11 2020 This volume is composed of two parts: Mathematical and Numerical Analysis for Strongly Nonlinear Plasma Models and Exact Controllability and Observability for Quasilinear Hyperbolic Systems and Applications. It presents recent progress and results obtained in the domains related to both subjects without attaching much importance to the details of proofs but rather to difficulties encountered, to open problems and possible ways to be exploited. It will be very useful for promoting further study on some important problems in the future.

Mathematical Theory of Evolutionary Fluid-Flow Structure Interactions Mar 06 2020 This book is devoted to the study of coupled partial differential equation models, which describe complex dynamical systems occurring in modern scientific applications such as fluid/flow-structure interactions. The first chapter provides a general description of a fluid-structure interaction, which is formulated within a realistic framework, where the structure subject to a frictional damping moves within the fluid. The second chapter then offers a multifaceted description, with often surprising results, of the case of the static interface; a case that is argued in the literature to be a good model for small, rapid oscillations of the structure. The third chapter describes flow-structure interaction where the compressible Navier-Stokes equations are replaced by the linearized Euler equation, while the solid is taken as a nonlinear plate, which oscillates in the surrounding gas flow. The final chapter focuses on a the equations of nonlinear acoustics coupled with linear acoustics or elasticity, as they arise in the context of high intensity ultrasound applications.

Harmonic Analysis Method for Nonlinear Evolution Equations, I Jul 02 2022 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