Differential Equations Of Infinite Order And Iopscience

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Stochastic Differential Equations in Infinite Dimensions
Introduction to Ordinary Differential Equations
A Treatise on Differential Equations
Infinite Dimensional And Finite Dimensional Stochastic Equations And Applications In Physics
Custom Publication
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Introduction to the Theory of Infinite-dimensional Dissipative Systems

BARKER ELVIS

Functional Differential Equations with Infinite Delay Walter de Gruyter GmbH & Co KG
Stochastic differential equations in infinite dimensional spaces are motivated by the theory and analysis of stochastic processes and by applications such as stochastic control, population biology, and turbulence, where the analysis and control of such systems involves investigating their stability. While the theory of such equations is well establ

Stochastic Differential Equations in Infinite Dimensions Springer Science & Business Media
State of the art treatment of a subject which has applications in mathematical physics, biology and finance. Includes discussion of applications to control theory. There are numerous notes and references that point to further reading. Coverage of some essential background material helps to make the book self contained.

Introduction to Ordinary Differential Equations Springer
This book is devoted to the theory of infinite-order linear and nonlinear differential operators with several real arguments and their applications to problems of partial differential equations and numerical analysis. Part I develops the theory of pseudodifferential operators with real analytic symbols, the local representatives of which are linear differential operators of infinite order acting in the spaces of basic and generalized functions based on the duality of the spaces of real analytic functions and functionals. Applications to a variety of problems of PDEs and numerical analysis are given. Part II is devoted to the theory of Sobolev-Orlicz spaces of infinite order and the solvability of nonlinear partial differential equations with arbitrary nonlinearities. Contents:PreliminariesPseudo-Differential Operators with Real Analytic SymbolsApplications to Pseudo-Differential EquationsApproximation MethodsA Mollification Method for Ill-Posed ProblemsNontriviality of Sobolev-Orlicz Spaces of Infinite OrderSome Properties of Sobolev-Orlicz Spaces of Infinite OrderElliptic Equations of Infinite Order with Arbitrary Nonlinearities Readership: Mathematicians, engineers and physicists. keywords:Pseudo-Differential Operators with Real Analytic Symbols;Pseudo-Differential Equations;Approximation Methods;Mollification Method for Ill-Posed Problems;Sobolev-Orlicz Spaces of Infinite Order;Elliptic Equations of Infinite Order with Arbitrary Nonlinearities

A Treatise on Differential Equations Springer
A systematic, self-contained treatment of the theory of stochastic differential equations in infinite dimensional spaces. Included is a discussion of Schwartz spaces of distributions in relation to probability theory and infinite dimensional stochastic analysis, as well as the random variables and stochastic processes that take values in infinite dimensional spaces.

Infinite Dimensional And Finite Dimensional Stochastic Equations And Applications In Physics Springer Science & Business Media
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.

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Contents: Some ExamplesLinear ProblemsGreen's FunctionMethod of Complementary FunctionsMethod of AdjointsMethod of ChasingSecond Order EquationsError Estimates in Polynomial InterpolationExistence and UniquenessPicard's and Approximate Picard's MethodQuasilinearization and Approximate QuasilinearizationBest Possible Results: Weight Function TechniqueBest Possible Results: Shooting MethodsMonotone Convergence and Further ExistenceUniqueness Implies ExistenceCompactness Condition and Generalized SolutionsUniqueness Implies UniquenessBoundary Value FunctionsTopological MethodsBest Possible Results: Control Theory MethodsMatching MethodsMaximal SolutionsMaximum PrincipleInfinite Interval ProblemsEquations with Deviating Arguments Readership: Graduate students, numerical analysts as well as researchers who are studying open problems. Keywords:Boundary Value Problems;Ordinary Differential Equations;Green's Function;Quasilinearization;Shooting Methods;Maximal Solutions;Infinite Interval Problems

The Laplace Differential Equation of Infinite Order World Scientific
Among the topics covered in this classic treatment are linear differential equations; solution in an infinite form; solution by definite integrals; algebraic theory; Sturmian theory and its later developments; further developments in the theory of boundary problems; existence theorems, equations of first order; nonlinear equations of higher order; more. "Highly recommended" — Electronics Industries.

Foundations of Stochastic Differential Equations in Infinite Dimensional Spaces CRC Press
This book focuses on solutions of second order, linear, parabolic, partial differentialequations on an infinite strip-emphasizing their integral representation, their initialvalues in several senses, and the relations between these.Parabolic Equations on an Infinite Strip provides valuable information-

previously unavailable in a single volume-on such topics as semigroup property.. . the Cauchy problem ... Gauss-Weierstrass representation . .. initial limits .. .normal limits and related representation theorems ... hyperplane conditions .. .determination of the initial measure .. . and the maximum principle. It also exploresnew, unpublished results on parabolic limits . . . more general limits ... and solutionssatisfying LP conditions.Requiring only a fundamental knowledge of general analysis and measure theory, thisbook serves as an excellent text for graduate students studying partial differentialequations and harmonic analysis, as well as a useful reference for analysts interested inapplied measure theory, and specialists in partial differential equations.

Structure Of Solutions Of Differential Equations Springer Science & Business Media

Dissipativity, as a natural mechanism of energy interchange is common to many physical systems that form the basis of modern automated control applications. Over the last decades it has turned out as a useful concept that can be generalized and applied in an abstracted form to very different system setups, including ordinary and partial differential equation models. In this monograph, the basic notions of stability, dissipativity and systems theory are connected in order to establish a common basis for designing system monitoring and control schemes. The approach is illustrated with a set of application examples covering finite and infinite-dimensional models, including a ship steering model, the inverted pendulum, chemical and biological reactors, relaxation oscillators, unstable heat equations and first-order hyperbolic integro-differential equations.

Dissipativity in Control Engineering World Scientific

In the theory of functional differential equations with infinite delay, there are several ways to choose the space of initial functions (phase space); and diverse (duplicated) theories arise, according to the choice of phase space. To unify the theories, an axiomatic approach has been taken since the 1960's. This book is intended as a guide for the axiomatic approach to the theory of equations with infinite delay and a culmination of the results obtained in this way. It can also be used as a textbook for a graduate course. The prerequisite knowledge is foundations of analysis including linear algebra and functional analysis. It is hoped that the book will prepare students for further study of this area, and that will serve as a ready reference to the researchers in applied analysis and engineering sciences.

Second Order PDE's in Finite and Infinite Dimension Springer

This volume contains survey articles on various aspects of stochastic partial differential equations (SPDEs) and their applications in stochastic control theory and in physics.The topics presented in this volume are:This book is intended not only for graduate students in mathematics or physics, but also for mathematicians, mathematical physicists, theoretical physicists, and science researchers interested in the physical applications of the theory of stochastic processes.

Functional Differential Equations with Infinite Delay Springer

In the theory of functional differential equations with infinite delay, there are several ways to choose the space of initial functions (phase space); and diverse (duplicated) theories arise, according to the choice of phase space. To unify the theories, an axiomatic approach has been taken since the 1960's. This book is intended as a guide for the axiomatic approach to the theory of equations with infinite delay and a culmination of the results obtained in this way. It can also be used as a textbook for a graduate course. The prerequisite knowledge is foundations of analysis including linear algebra and functional analysis. It is hoped that the book will prepare students for further study of this area, and that will serve as a ready reference to the researchers in applied analysis and engineering sciences.

Ordinary Differential Equations and Their Solutions Springer

Infinite interval problems abound in nature and yet until now there has been no book dealing with such problems. The main reason for this seems to be that until the 1970's for the infinite interval problem all the theoretical results available required rather technical hypotheses and were applicable only to narrowly defined classes of problems. Thus scientists mainly offer~d and used special devices to construct the numerical solution assuming tacitly the existence of a solution. In recent years a mixture of classical analysis and modern fixed point theory has been employed to study the existence of solutions to infinite interval problems. This has resulted in widely applicable results. This monograph is a cumulation mainly of the authors' research over a period of more than ten years and offers easily verifiable existence criteria for differential, difference and integral equations over the infinite interval. An important feature of this monograph is that we illustrate almost all the results with examples. The plan of this monograph is as follows. In Chapter 1 we present the existence theory for second order boundary value problems on infinite intervals. We begin with several examples which model real world phenom ena. A brief history of the infinite interval problem is also included. We then present general existence results for several different types of boundary value problems. Here we note that for the infinite interval problem only two major approaches are available in the literature.

Analysis, Modeling and Stability of Fractional Order Differential Systems 2 Routledge

Updates in this second edition include two brand new chapters and an even more comprehensive bibliography.

Sobolev Spaces of Infinite Order and Differential Equations Courier Corporation

This research monograph brings together, for the first time, the varied literature on Yosida approximations of stochastic differential equations (SDEs) in infinite dimensions and their applications into a single cohesive work. The author provides a clear and systematic introduction to the Yosida approximation method and justifies its power by presenting its applications in some practical topics such as stochastic stability and stochastic optimal control. The theory assimilated spans more than 35 years of mathematics, but is developed slowly and methodically in digestible pieces. The book begins with a motivational chapter that introduces the reader to several different models that play recurring roles throughout the book as the theory is unfolded, and invites readers from different disciplines to see immediately that the effort required to work through the theory that follows is worthwhile. From there, the author presents the necessary prerequisite material, and then launches the reader into the main discussion of the monograph, namely, Yosida approximations of SDEs, Yosida approximations of SDEs with Poisson jumps, and their applications. Most of the results considered in the main chapters appear for the first time in a book form, and contain illustrative examples on stochastic partial differential equations. The key steps are included in all proofs, especially the various estimates, which help the reader to get a true feel for the theory of Yosida approximations and their use. This work is intended for researchers and graduate students in mathematics specializing in probability theory and will appeal to numerical analysts, engineers,

physicists and practitioners in finance who want to apply the theory of stochastic evolution equations. Since the approach is based mainly in semigroup theory, it is amenable to a wide audience including non-specialists in stochastic processes.

Dynamics in Infinite Dimensions John Wiley & Sons

This book introduces an original fractional calculus methodology (‘the infinite state approach’) which is applied to the modeling of fractional order differential equations (FDEs) and systems (FDSs). Its modeling is based on the frequency distributed fractional integrator, while the resulting model corresponds to an integer order and infinite dimension state space representation. This original modeling allows the theoretical concepts of integer order systems to be generalized to fractional systems, with a particular emphasis on a convolution formulation.

Stability of Infinite Dimensional Stochastic Differential Equations with Applications "Acta" publishers

The systematic study of existence, uniqueness, and properties of solutions to stochastic differential equations in infinite dimensions arising from practical problems characterizes this volume that is intended for graduate students and for pure and applied mathematicians, physicists, engineers, professionals working with mathematical models of finance. Major methods include compactness, coercivity, monotonicity, in a variety of set-ups. The authors emphasize the fundamental work of Gikhman and Skorokhod on the existence and uniqueness of solutions to stochastic differential equations and present its extension to infinite dimension. They also generalize the work of Khasminskii on stability and stationary distributions of solutions. New results, applications, and examples of stochastic partial differential equations are included. This clear and detailed presentation gives the basics of the infinite dimensional version of the classic books of Gikhman and Skorokhod and of Khasminskii in one concise volume that covers the main topics in infinite dimensional stochastic PDE’s. By appropriate selection of material, the volume can be adapted for a 1- or 2-semester course, and can prepare the reader for research in this rapidly expanding area.

Infinite Dimensional Dynamical Systems Academic Press

A collection of papers on current topics and future problems in the theory of differential equations which were reported at the Taniguchi symposium (Katata) and RIMS symposium (Kyoto); Painlevé transcendents, Borel resummation, linear differential equations of infinite order, solvability of microdifferential equations, Gevrey index, etc. are among them.

Boundary Value Problems From Higher Order Differential Equations Nova Publishers

While this book was being printed, the news of Michel Métivier's premature death arrived at the Scuola Normale Superiore. The present book originated from a series of lectures Michel Métivier held at the Scuola Normale during the years 1986 and 1987. The subject of these lectures was the analysis of weak solutions to stochastic partial equations, a topic that requires a deep knowledge of nonlinear functional analysis and probability. A vast literature, involving a number of applications to various scientific fields is devoted to this problem and many different approaches have been developed. In his lectures Métivier gave a new treatment of the subject, which unifies the theory and provides several new results. The power of his new approach has not yet been fully exploited and would certainly have led him to further interesting developments. For this reason, besides the invaluable enthusiasm in life he was able to communicate to everybody, his recent premature departure is even more painful.

Partial Ordering Methods in Nonlinear Problems Nova Publishers

The main objective of this monograph is the study of a class of stochastic differential systems having unbounded coefficients, both in finite and in infinite dimension. We focus our attention on the regularity properties of the solutions and hence on the smoothing effect of the corresponding transition semigroups in the space of bounded and uniformly continuous functions. As an application of these results, we study the associated Kolmogorov equations, the large-time behaviour of the solutions and some stochastic optimal control problems together with the corresponding Hamilton-Jacobi-Bellman equations. In the literature there exists a large number of works (mostly in finite dimen sion) dealing with these arguments in the case of bounded Lipschitz-continuous coefficients and some of them concern the case of coefficients having linear growth. Few papers concern the case of non-Lipschitz coefficients, but they are mainly re lated to the study of the existence and the uniqueness of solutions for the stochastic system. Actually, the study of any further properties of those systems, such as their regularizing properties or their ergodicity, seems not to be developed widely enough. With these notes we try to cover this gap.

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