

1. Record Nr.	UNINA9910741164503321
Autore	Ahmed N. U (Nasir Uddin)
Titolo	Measure-valued solutions for nonlinear evolution equations on Banach spaces and their optimal control / / N.U. Ahmed, Shian Wang
Pubbl/distr/stampa	Cham : , : Springer, , [2023] ©2023
ISBN	3-031-37260-3 9783031372605
Descrizione fisica	1 online resource (xiii, 227 pages)
Disciplina	515.355
Soggetti	Evolution equations, Nonlinear Banach spaces Differential equations System theory Control theory Functional analysis Mathematics Engineering mathematics Differential Equations Systems Theory, Control Functional Analysis Applications of Mathematics Engineering Mathematics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Intro -- Preface -- Contents -- 1 Background Materials From Analysis -- 1.1 Introduction -- 1.2 Vector-Valued Measures -- 1.3 Multi Valued Functions -- 1.4 Bibliographical Notes -- 2 Measure Solutions for Deterministic Evolution Equations -- 2.1 Evolution Equations with Continuous Vector Fields -- 2.1.1 Motivation -- 2.1.2 Introduction -- 2.2 Evolution Equations Under Relaxed Hypothesis -- 2.2.1 Competing Notions of Solutions -- 2.2.2 Quasilinear Problems -- 2.3 Evolution Equations with Measurable Vector Fields -- 2.3.1 Introduction -- 2.3.2

Existence of Measure Solutions -- 2.3.3 Differential Equations on the Space of Measures -- 2.4 Bibliographical Notes -- 3 Measure Solutions for Impulsive Systems -- 3.1 Introduction -- 3.2 Spaces of Measure-Valued Functions -- 3.3 Measure-Valued Solutions -- 3.3.1 Existence of Measure Solutions -- 3.3.2 Measure Solutions vs. Pathwise Solutions -- 3.4 Differential Equations on the Space of Measures -- 3.5 Differential Inclusions -- 3.5.1 Classical Model -- 3.5.2 General Model -- 3.6 Bibliographical Notes -- 4 Measure Solutions for Stochastic Systems -- 4.1 Introduction -- 4.2 Existence of Measure Solutions -- 4.2.1 Martingale vs. Generalized Solutions -- 4.2.2 Some Illustrative Examples -- 4.3 Stochastic Systems Driven by Martingale Measures -- 4.3.1 Special Vector Spaces -- 4.3.2 Some Basic Properties of the Martingale Measure M -- 4.3.3 Basic Formulation of the System -- 4.3.4 Existence of Measure Solutions -- 4.4 Extension to Measurable Vector Fields -- 4.5 Bibliographical Notes -- 5 Measure Solutions for Neutral Evolution Equations -- 5.1 Introduction -- 5.2 Basic Background Materials -- 5.3 Existence of Measure Solutions and Their Regularity -- 5.4 Stochastic Neutral Systems -- 5.4.1 Basic Background Materials -- 5.4.2 Existence of Measure Solutions and Their Regularity. 5.5 Second Order Neutral Differential Equations -- 5.5.1 Introduction -- 5.5.2 Some Basic Notations -- 5.5.3 System Models -- 5.5.4 System Models Generating C_0 -Group -- 5.5.5 Existence and Regularity of Solutions -- 5.6 Stochastic Second Order Neutral Systems -- 5.7 Bibliographical Notes -- 6 Optimal Control of Evolution Equations -- 6.1 Optimal Control of Deterministic Systems -- 6.2 Optimal Control of Impulsive Systems -- 6.3 Optimal Control of Stochastic Systems -- 6.4 Optimal Control of Neutral Systems -- 6.4.1 Deterministic Neutral Systems (DNS) -- 6.4.2 Stochastic Neutral Systems (SNS) -- 6.5 Bibliographical Notes -- 7 Examples From Physical Sciences -- 7.1 Nonlinear Schrödinger Equation -- 7.1.1 Basic Formulation of the System Model -- 7.1.2 Existence and Uniqueness of Solutions -- 7.2 Stochastic Navier-Stokes Equation -- 7.3 Reaction Diffusion Equation (Biomedical Application) -- 7.4 Bibliographical Notes -- Reference -- Index.

Sommario/riassunto

This book offers the first comprehensive presentation of measure-valued solutions for nonlinear deterministic and stochastic evolution equations on infinite dimensional Banach spaces. Unlike traditional solutions, measure-valued solutions allow for a much broader class of abstract evolution equations to be addressed, providing a broader approach. The book presents extensive results on the existence of measure-valued solutions for differential equations that have no solutions in the usual sense. It covers a range of topics, including evolution equations with continuous/discontinuous vector fields, neutral evolution equations subject to vector measures as impulsive forces, stochastic evolution equations, and optimal control of evolution equations. The optimal control problems considered cover the existence of solutions, necessary conditions of optimality, and more, significantly complementing the existing literature. This book will be of great interest to researchers in functional analysis, partial differential equations, dynamic systems and their optimal control, and their applications, advancing previous research and providing a foundation for further exploration of the field.
