

MEASURABLE MULTIFUNCTIONS AND THEIR APPLICATIONS TO CONVEX INTEGRAL FUNCTIONALS

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ABSTRACT. The purpose of this paper is to establish some new properties of set valued measurable functions and of their sets of integrable selectors and to use them to study convex integral functionals defined on Lebesgue-Bochner spaces. In this process we also obtain a characterization of separable dual Banach spaces using multifunctions and we present some generalizations of the classical "bang-bang" principle to infinite dimensional linear control systems with time dependent control constraints.

KEY WORD AND PHRASES. Measurable multifunction, integrably bounded, measurable selection, Souslin space, Weak Random-Nikodym property, set valued conditional expectation, infinite dimensional linear control systems, bang-bang principle, convex normal integrand, subgradient, subdifferential, conjugate, effective domain, absolutely continuous functional, singular functional, Yosida-Hewitt theorem.

1980 AMS SUBJECT CLASSIFICATION CODES. Primary 28A45, 46G10, 46E30, Secondary 54C60.

1. INTRODUCTION.

In the last decade the study of measurable set valued functions has been developed extensively, both in the theoretical direction and the direction of applications. Many mathematicians have contributed significant results in this area, which combines challenging theoretical problems with important applications in a variety of fields, like optimization theory, optimal control, statistics and mathematical economics. In all those areas the systematic use of multifunctions has allowed people to make significant progress and solve many problems.

With a series of recent papers [18] - [25] the author has started an effort to extend the general theory of Banach space valued multifunctions and the closely related theory of multimeasures. The present paper continues this effort and provides some applications of the theoretical results obtained.

Briefly this paper is organized as follows. In the next section we establish our notation and for the convenience of the reader we recall some basic definitions and

Measurable Selectors Of Pca Multifunctions With Applications

J. Andres, Lech Górniewicz



Measurable Selectors Of Pca Multifunctions With Applications:

Measurable Selectors of $\mathrm{\underline{PCA}}$ Multifunctions with Applications Marian Srebrny, 1984 In this paper measurable selection theory is studied from the modern descriptive set theory point of view

Measurable Selectors of PCA Multifunctions with Applications Michael Eugene Taylor, André Joyal, Jerome William Hoffman, Josefina Casasayas, Marian Srebrny, Roger D. Nussbaum, 1984

Topological Fixed Point Theory of Multivalued Mappings Lech Górniewicz, 2006-06-03 This book is an attempt to give a systematic presentation of results and methods which concern the fixed point theory of multivalued mappings and some of its applications In selecting the material we have restricted ourselves to studying topological methods in the fixed point theory of multivalued mappings and applications mainly to differential inclusions Thus in Chapter III the approximation on the graph method in fixed point theory of multivalued mappings is presented Chapter IV is devoted to the homological methods and contains more general results e.g. the Lefschetz Fixed Point Theorem the fixed point index and the topological degree theory In Chapter V applications to some special problems in fixed point theory are formulated Then in the last chapter direct applications to differential inclusions are presented Note that Chapters I and II have an auxiliary character and only results connected with the Banach Contraction Principle see Chapter II are strictly related to topological methods in the fixed point theory In the last section of our book see Section 75 we give a bibliographical guide and also signal some further results which are not contained in our monograph The author thanks several colleagues and my wife Maria who read and commented on the manuscript These include J Andres A Buraczewski G Gabor A Gorka M Górniewicz S Park and A Wiecek The author wishes to express his gratitude to P Konstanty for preparing the electronic version of this monograph

Solution Sets for Differential Equations and Inclusions Smaïl Djebali, Lech Górniewicz, Abdelghani Ouahab, 2012-12-06 This monograph gives a systematic presentation of classical and recent results obtained in the last couple of years It comprehensively describes the methods concerning the topological structure of fixed point sets and solution sets for differential equations and inclusions Many of the basic techniques and results recently developed about this theory are presented as well as the literature that is disseminated and scattered in several papers of pioneering researchers who developed the functional analytic framework of this field over the past few decades Several examples of applications relating to initial and boundary value problems are discussed in detail The book is intended to advanced graduate researchers and instructors active in research areas with interests in topological properties of fixed point mappings and applications it also aims to provide students with the necessary understanding of the subject with no deep background material needed This monograph fills the vacuum in the literature regarding the topological structure of fixed point sets and its applications

Topological Fixed Point Principles for Boundary Value Problems J. Andres, Lech Górniewicz, 2013-04-17 The book is devoted to the topological fixed point theory both for single valued and multivalued mappings in locally convex spaces including its application to boundary value problems for ordinary differential equations inclusions and to multivalued

dynamical systems It is the first monograph dealing with the topological fixed point theory in non metric spaces Although the theoretical material was tendentiously selected with respect to applications the text is self contained Therefore three appendices concerning almost periodic and derivo periodic single valued multivalued functions and multivalued fractals are supplied to the main three chapters **Annales de L'I.H.P.** ,1987 **Mathematical Reviews** ,1986 **Paperbound**

Books in Print ,1991 **Subject Guide to Books in Print** ,1996 *Handbook of Game Theory with Economic Applications* R.J. Aumann,S. Hart,1992-11-19 This is the first volume of the Handbook of Game Theory with Economic Applications to be followed by two additional volumes Game Theory has developed greatly in the last decade and today it is an essential tool in much of economic theory The three volumes will cover the fundamental theoretical aspects a wide range of applications to economics several chapters on applications to political science and individual chapters on relations with other disciplines The topics covered in the present volume include chess playing computers an introduction to the non cooperative theory repeated games bargaining theory auctions location entry deterrence patents the cooperative theory and its applications and the relation between Game Theory and ethics For more information on the Handbooks in Economics series please see our home page on <http://www.elsevier.nl/locate/hes> **American Book Publishing Record** ,1985

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Table of Contents Measurable Selectors Of Pca Multifunctions With Applications

1. Understanding the eBook Measurable Selectors Of Pca Multifunctions With Applications
 - The Rise of Digital Reading Measurable Selectors Of Pca Multifunctions With Applications
 - Advantages of eBooks Over Traditional Books
2. Identifying Measurable Selectors Of Pca Multifunctions With Applications
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an eBook Platform
 - User-Friendly Interface
4. Exploring eBook Recommendations from Measurable Selectors Of Pca Multifunctions With Applications
 - Personalized Recommendations
 - Measurable Selectors Of Pca Multifunctions With Applications User Reviews and Ratings

- Measurable Selectors Of Pca Multifunctions With Applications and Bestseller Lists
- 5. Accessing Measurable Selectors Of Pca Multifunctions With Applications Free and Paid eBooks
 - Measurable Selectors Of Pca Multifunctions With Applications Public Domain eBooks
 - Measurable Selectors Of Pca Multifunctions With Applications eBook Subscription Services
 - Measurable Selectors Of Pca Multifunctions With Applications Budget-Friendly Options
- 6. Navigating Measurable Selectors Of Pca Multifunctions With Applications eBook Formats
 - ePub, PDF, MOBI, and More
 - Measurable Selectors Of Pca Multifunctions With Applications Compatibility with Devices
 - Measurable Selectors Of Pca Multifunctions With Applications Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Measurable Selectors Of Pca Multifunctions With Applications
 - Highlighting and Note-Taking Measurable Selectors Of Pca Multifunctions With Applications
 - Interactive Elements Measurable Selectors Of Pca Multifunctions With Applications
- 8. Staying Engaged with Measurable Selectors Of Pca Multifunctions With Applications
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Measurable Selectors Of Pca Multifunctions With Applications
- 9. Balancing eBooks and Physical Books Measurable Selectors Of Pca Multifunctions With Applications
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Measurable Selectors Of Pca Multifunctions With Applications
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Measurable Selectors Of Pca Multifunctions With Applications
 - Setting Reading Goals Measurable Selectors Of Pca Multifunctions With Applications
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Measurable Selectors Of Pca Multifunctions With Applications
 - Fact-Checking eBook Content of Measurable Selectors Of Pca Multifunctions With Applications
 - Distinguishing Credible Sources

13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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