

A Study On Fixed Point Theory With Applications

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Topological Fixed Point Theory and Applications - Boju Jiang 1989-11-28
This selection of papers from the Beijing conference gives a cross-section of the current trends in the field of fixed point theory as seen by topologists and analysts. Apart from one survey article, they are all original research articles, on topics including equivariant theory, extensions of Nielsen theory, periodic orbits of discrete and continuous dynamical systems, and new invariants and techniques in topological approaches to analytic problems.

Fixed Point Theory in Metric Type Spaces - Ravi P. Agarwal
2016-03-24

Written by a team of leading experts in the field, this volume presents a self-contained account of the theory, techniques and results in metric type spaces (in particular in G-metric spaces); that is, the text approaches this important area of fixed point analysis beginning from the basic ideas of metric space topology. The text is structured so that it leads the reader from preliminaries and historical notes on metric spaces (in particular G-metric spaces) and on mappings, to Banach type contraction theorems in metric type spaces, fixed point theory in partially ordered G-metric spaces, fixed point theory for expansive

mappings in metric type spaces, generalizations, present results and techniques in a very general abstract setting and framework. Fixed point theory is one of the major research areas in nonlinear analysis. This is partly due to the fact that in many real world problems fixed point theory is the basic mathematical tool used to establish the existence of solutions to problems which arise naturally in applications. As a result, fixed point theory is an important area of study in pure and applied mathematics and it is a flourishing area of research.

Fixed Point Theory and Graph Theory - Monther Alfuraidan
2016-06-20

Fixed Point Theory and Graph Theory provides an intersection between the theories of fixed point theorems that give the conditions under which maps (single or multivalued) have solutions and graph theory which uses mathematical structures to illustrate the relationship between ordered pairs of objects in terms of their vertices and directed edges. This edited reference work is perhaps the first to provide a link between the two theories, describing not only their foundational aspects, but also the most recent advances and the fascinating intersection of the domains. The authors provide solution methods for fixed points in different

settings, with two chapters devoted to the solutions method for critically important non-linear problems in engineering, namely, variational inequalities, fixed point, split feasibility, and hierarchical variational inequality problems. The last two chapters are devoted to integrating fixed point theory in spaces with the graph and the use of retractions in the fixed point theory for ordered sets. Introduces both metric fixed point and graph theory in terms of their disparate foundations and common application environments Provides a unique integration of otherwise disparate domains that aids both students seeking to understand either area and researchers interested in establishing an integrated research approach Emphasizes solution methods for fixed points in non-linear problems such as variational inequalities, split feasibility, and hierarchical variational inequality problems that is particularly appropriate for engineering and core science applications

Advances in Metric Fixed Point Theory and Applications - Yeol Je Cho
2021-06-05

This book collects papers on major topics in fixed point theory and its applications. Each chapter is accompanied by basic notions, mathematical preliminaries and proofs of the main results. The book discusses common fixed point theory, convergence theorems, split variational inclusion problems and fixed point problems for asymptotically nonexpansive semigroups; fixed point property and almost fixed point property in digital spaces, nonexpansive semigroups over $CAT(\kappa)$ spaces, measures of noncompactness, integral equations, the study of fixed points that are zeros of a given function, best proximity point theory, monotone mappings in modular function spaces, fuzzy contractive mappings, ordered hyperbolic metric spaces, generalized contractions in b-metric spaces, multi-tupled fixed points, functional equations in dynamic programming and Picard operators. This book addresses the mathematical community working with methods and tools of nonlinear analysis. It also serves as a reference, source for examples and new approaches associated with fixed point theory and its applications for a wide audience including graduate students and researchers.

Fixed Point Theory in Metric Spaces - Praveen Agarwal 2018-10-13

This book provides a detailed study of recent results in metric fixed point theory and presents several applications in nonlinear analysis, including matrix equations, integral equations and polynomial approximations. Each chapter is accompanied by basic definitions, mathematical preliminaries and proof of the main results. Divided into ten chapters, it discusses topics such as the Banach contraction principle and its converse; Ran-Reurings fixed point theorem with applications; the existence of fixed points for the class of α - ψ contractive mappings with applications to quadratic integral equations; recent results on fixed point theory for cyclic mappings with applications to the study of functional equations; the generalization of the Banach fixed point theorem on Branciari metric spaces; the existence of fixed points for a certain class of mappings satisfying an implicit contraction; fixed point results for a class of mappings satisfying a certain contraction involving extended simulation functions; the solvability of a coupled fixed point problem under a finite number of equality constraints; the concept of generalized metric spaces, for which the authors extend some well-known fixed point results; and a new fixed point theorem that helps in establishing a Kelisky-Rivlin type result for q-Bernstein polynomials and modified q-Bernstein polynomials. The book is a valuable resource for a wide audience, including graduate students and researchers.

Topological Fixed Point Theory of Multivalued Mappings - Lech Górniewicz 1999

This volume presents a broad introduction to the topological fixed point theory of multivalued (set-valued) mappings, treating both classical concepts as well as modern techniques. A variety of up-to-date results is described within a unified framework.

Mathematical Analysis and Applications - Michael Ruzhansky
2018-04-11

An authoritative text that presents the current problems, theories, and applications of mathematical analysis research *Mathematical Analysis and Applications: Selected Topics* offers the theories, methods, and applications of a variety of targeted topics including: operator theory,

approximation theory, fixed point theory, stability theory, minimization problems, many-body wave scattering problems, Basel problem, Corona problem, inequalities, generalized normed spaces, variations of functions and sequences, analytic generalizations of the Catalan, Fuss, and Fuss-Catalan Numbers, asymptotically developable functions, convex functions, Gaussian processes, image analysis, and spectral analysis and spectral synthesis. The authors—a noted team of international researchers in the field—highlight the basic developments for each topic presented and explore the most recent advances made in their area of study. The text is presented in such a way that enables the reader to follow subsequent studies in a burgeoning field of research. This important text: Presents a wide-range of important topics having current research importance and interdisciplinary applications such as game theory, image processing, creation of materials with a desired refraction coefficient, etc. Contains chapters written by a group of esteemed researchers in mathematical analysis Includes problems and research questions in order to enhance understanding of the information provided Offers references that help readers advance to further study Written for researchers, graduate students, educators, and practitioners with an interest in mathematical analysis, Mathematical Analysis and Applications: Selected Topics includes the most recent research from a range of mathematical fields.

Fixed Point Theory and Applications - Ravi P. Agarwal 2001-03-22

This book provides a clear exposition of the flourishing field of fixed point theory. Starting from the basics of Banach's contraction theorem, most of the main results and techniques are developed: fixed point results are established for several classes of maps and the three main approaches to establishing continuation principles are presented. The theory is applied to many areas of interest in analysis. Topological considerations play a crucial role, including a final chapter on the relationship with degree theory. Researchers and graduate students in applicable analysis will find this to be a useful survey of the fundamental principles of the subject. The very extensive bibliography and close to 100 exercises mean that it can be used both as a text and as a comprehensive reference

work, currently the only one of its type.

Fixed Point Theory and Its Applications - Robert F. Brown
1988-12-31

Fixed point theory touches on many areas of mathematics, such as general topology, algebraic topology, nonlinear functional analysis, and ordinary and partial differential equations and serves as a useful tool in applied mathematics. This book represents the proceedings of an informal three-day seminar held during the International Congress of Mathematicians in Berkeley in 1986. Bringing together topologists and analysts concerned with the study of fixed points of continuous functions, the seminar provided a forum for presentation of recent developments in several different areas. The topics covered include both topological fixed point theory from both the algebraic and geometric viewpoints, the fixed point theory of nonlinear operators on normed linear spaces and its applications, and the study of solutions of ordinary and partial differential equations by fixed point theory methods. Because the papers range from broad expositions to specialized research papers, the book provides readers with a good overview of the subject as well as a more detailed look at some specialized recent advances.

A Fixed-Point Farrago - Joel H. Shapiro 2016-05-23

This text provides an introduction to some of the best-known fixed-point theorems, with an emphasis on their interactions with topics in analysis. The level of exposition increases gradually throughout the book, building from a basic requirement of undergraduate proficiency to graduate-level sophistication. Appendices provide an introduction to (or refresher on) some of the prerequisite material and exercises are integrated into the text, contributing to the volume's ability to be used as a self-contained text. Readers will find the presentation especially useful for independent study or as a supplement to a graduate course in fixed-point theory. The material is split into four parts: the first introduces the Banach Contraction-Mapping Principle and the Brouwer Fixed-Point Theorem, along with a selection of interesting applications; the second focuses on Brouwer's theorem and its application to John Nash's work; the third applies Brouwer's theorem to spaces of infinite dimension; and the fourth

rests on the work of Markov, Kakutani, and Ryll-Nardzewski surrounding fixed points for families of affine maps.

Multiple Fixed-Point Theorems and Applications in the Theory of ODEs, FDEs and PDEs - Svetlin G. Georgiev 2020-06-09

Multiple Fixed-Point Theorems and Applications in the Theory of ODEs, FDEs and PDEs covers all the basics of the subject of fixed-point theory and its applications with a strong focus on examples, proofs and practical problems, thus making it ideal as course material but also as a reference for self-study. Many problems in science lead to nonlinear equations $Tx + Fx = x$ posed in some closed convex subset of a Banach space. In particular, ordinary, fractional, partial differential equations and integral equations can be formulated like these abstract equations. It is desirable to develop fixed-point theorems for such equations. In this book, the authors investigate the existence of multiple fixed points for some operators that are of the form $T + F$, where T is an expansive operator and F is a k -set contraction. This book offers the reader an overview of recent developments of multiple fixed-point theorems and their applications. About the Authors Svetlin G. Georgiev is a mathematician who has worked in various areas of mathematics. He currently focuses on harmonic analysis, functional analysis, partial differential equations, ordinary differential equations, Clifford and quaternion analysis, integral equations and dynamic calculus on time scales. Khaled Zennir is assistant professor at Qassim University, KSA. He received his PhD in mathematics in 2013 from Sidi Bel Abbès University, Algeria. He obtained his Habilitation in mathematics from Constantine University, Algeria in 2015. His research interests lie in nonlinear hyperbolic partial differential equations: global existence, blow up and long-time behavior. *Handbook of Metric Fixed Point Theory* - William Kirk 2011-09-17 Metric fixed point theory encompasses the branch of fixed point theory which metric conditions on the underlying space and/or on the mappings play a fundamental role. In some sense the theory is a far-reaching outgrowth of Banach's contraction mapping principle. A natural extension of the study of contractions is the limiting case when the Lipschitz constant is allowed to equal one. Such mappings are called

nonexpansive. Nonexpansive mappings arise in a variety of natural ways, for example in the study of holomorphic mappings and hyperconvex metric spaces. Because most of the spaces studied in analysis share many algebraic and topological properties as well as metric properties, there is no clear line separating metric fixed point theory from the topological or set-theoretic branch of the theory. Also, because of its metric underpinnings, metric fixed point theory has provided the motivation for the study of many geometric properties of Banach spaces. The contents of this Handbook reflect all of these facts. The purpose of the Handbook is to provide a primary resource for anyone interested in fixed point theory with a metric flavor. The goal is to provide information for those wishing to find results that might apply to their own work and for those wishing to obtain a deeper understanding of the theory. The book should be of interest to a wide range of researchers in mathematical analysis as well as to those whose primary interest is the study of fixed point theory and the underlying spaces. The level of exposition is directed to a wide audience, including students and established researchers.

An In-Depth Guide to Fixed-Point Theorems - Rajinder Sharma 2021

"This book details fixed point theory, a gripping and wide-ranging field with applications in multifold areas of pure and applied mathematics. The content comprises both theoretical and practical applications. The evolution of the main theorems on the existence and uniqueness of fixed points of maps are presented. Applications covering topological properties, a nonlinear stochastic integral equation of the Hammerstein type, the existence and uniqueness of a common solution of the system of Urysohn integral equations, and the existence of a unique solution for linear equations system are included in this selection. Since the included chapters range from broad elucidations to functional research papers, the book provides readers with a satisfying analysis of the subject as well as a more comprehensive look at some functional recent advances"--
An Introduction to Metric Spaces and Fixed Point Theory - Mohamed A. Khamsi 2011-10-14

Presents up-to-date Banach space results. * Features an extensive

bibliography for outside reading. * Provides detailed exercises that elucidate more introductory material.

Topics in Fixed Point Theory - Saleh Almezal 2013-10-23

The purpose of this contributed volume is to provide a primary resource for anyone interested in fixed point theory with a metric flavor. The book presents information for those wishing to find results that might apply to their own work and for those wishing to obtain a deeper understanding of the theory. The book should be of interest to a wide range of researchers in mathematical analysis as well as to those whose primary interest is the study of fixed point theory and the underlying spaces. The level of exposition is directed to a wide audience, including students and established researchers. Key topics covered include Banach contraction theorem, hyperconvex metric spaces, modular function spaces, fixed point theory in ordered sets, topological fixed point theory for set-valued maps, coincidence theorems, Lefschetz and Nielsen theories, systems of nonlinear inequalities, iterative methods for fixed point problems, and the Ekeland's variational principle.

Fixed Point Theorems and Applications - Vittorino Pata 2019-09-22

This book addresses fixed point theory, a fascinating and far-reaching field with applications in several areas of mathematics. The content is divided into two main parts. The first, which is more theoretical, develops the main abstract theorems on the existence and uniqueness of fixed points of maps. In turn, the second part focuses on applications, covering a large variety of significant results ranging from ordinary differential equations in Banach spaces, to partial differential equations, operator theory, functional analysis, measure theory, and game theory. A final section containing 50 problems, many of which include helpful hints, rounds out the coverage. Intended for Master's and PhD students in Mathematics or, more generally, mathematically oriented subjects, the book is designed to be largely self-contained, although some mathematical background is needed: readers should be familiar with measure theory, Banach and Hilbert spaces, locally convex topological vector spaces and, in general, with linear functional analysis.

Fixed Point Theory in Distance Spaces - William Kirk 2014-10-23

This is a monograph on fixed point theory, covering the purely metric aspects of the theory—particularly results that do not depend on any algebraic structure of the underlying space. Traditionally, a large body of metric fixed point theory has been couched in a functional analytic framework. This aspect of the theory has been written about extensively. There are four classical fixed point theorems against which metric extensions are usually checked. These are, respectively, the Banach contraction mapping principle, Nadler's well known set-valued extension of that theorem, the extension of Banach's theorem to nonexpansive mappings, and Caristi's theorem. These comparisons form a significant component of this book. This book is divided into three parts. Part I contains some aspects of the purely metric theory, especially Caristi's theorem and a few of its many extensions. There is also a discussion of nonexpansive mappings, viewed in the context of logical foundations. Part I also contains certain results in hyperconvex metric spaces and ultrametric spaces. Part II treats fixed point theory in classes of spaces which, in addition to having a metric structure, also have geometric structure. These specifically include the geodesic spaces, length spaces and CAT(0) spaces. Part III focuses on distance spaces that are not necessarily metric. These include certain distance spaces which lie strictly between the class of semimetric spaces and the class of metric spaces, in that they satisfy relaxed versions of the triangle inequality, as well as other spaces whose distance properties do not fully satisfy the metric axioms.

Advanced Fixed Point Theory for Economics - Andrew McLennan 2018-07-03

This book develops the central aspect of fixed point theory – the topological fixed point index – to maximal generality, emphasizing correspondences and other aspects of the theory that are of special interest to economics. Numerous topological consequences are presented, along with important implications for dynamical systems. The book assumes the reader has no mathematical knowledge beyond that which is familiar to all theoretical economists. In addition to making the material available to a broad audience, avoiding algebraic topology

results in more geometric and intuitive proofs. Graduate students and researchers in economics, and related fields in mathematics and computer science, will benefit from this book, both as a useful reference and as a well-written rigorous exposition of foundational mathematics. Numerous problems sketch key results from a wide variety of topics in theoretical economics, making the book an outstanding text for advanced graduate courses in economics and related disciplines.

[A Study on Fixed Point Theory](#) - Ph Singh 2013-09-19

Fixed Point Theory is an attractive and interesting subject with a large number of applications in various fields of mathematics and other branches of science. This book offers encouragement and empowers readers to embrace the basic history, the basic types of fixed point theories, important theorems and some common selected applications of fixed point theory. Above all, only lucid language is used so that this book will also be beginners friendly. A brief description of the contents is given below: Chapter 1: Introduction: 2 pages Concept of fixed point, a brief history, basic types of the theory. Chapter 2: Topological Fixed Point Theory: 68 pages Introduction and Background: Topological Fixed Point Property, Background on Simplexes and Triangulations, Background in Analysis And Topology, Upper Semi-continuous Multifunctions. The Brower's Fixed point Theorem: Proof by Non Analytic Methods, Proof by Analytic Methods. Sperner's Lemma and Brower's Fixed Point Theorem, Barycentric Coordinates. Generalization: Extension in Infinite Dimensions, Fixed Point Properties for Closed Boundary Convex Sets, Theorems with boundary Conditions Condition on Compactness. Multifunctions and Kakutani's Theorem, Theory with Boundary Conditions. Applications. Chapter 3: Metric Fixed Point Theory: 45 pages Introduction: Banach's Contraction Principle, Extensions of the Contraction Principle, Generalization. Converse of Banach's Contraction Principle. Metric Fixed Point Theory in Banach Spaces. Metric Fixed Point Theory in Metric Spaces. Applications. Chapter 4: Order-Theoretic Fixed Point Theory: 17 pages Introduction, Completeness Condition for Posets, Conditionally Complete Posets, Countably Chain-Complete Posets, Chain-Complete Posets. Iterative

Fixed Point Theorems, The Tarski-Kantorovitch Fixed Point Theorem, Applications to Functional Equations, The Contraction Mapping Theorem. The Tarski's Fixed Point Theorems, The Knaster-Tarski's Theorem, Application. The Abian-Brown Theorem, Application. An extensive bibliography.

Topics in Fixed Point Theory - Saleh Almezal 2013-11-08

The purpose of this contributed volume is to provide a primary resource for anyone interested in fixed point theory with a metric flavor. The book presents information for those wishing to find results that might apply to their own work and for those wishing to obtain a deeper understanding of the theory. The book should be of interest to a wide range of researchers in mathematical analysis as well as to those whose primary interest is the study of fixed point theory and the underlying spaces. The level of exposition is directed to a wide audience, including students and established researchers. Key topics covered include Banach contraction theorem, hyperconvex metric spaces, modular function spaces, fixed point theory in ordered sets, topological fixed point theory for set-valued maps, coincidence theorems, Lefschetz and Nielsen theories, systems of nonlinear inequalities, iterative methods for fixed point problems, and the Ekeland's variational principle.

Topology and Approximate Fixed Points - Afif Ben Amar 2022-01-25

This book examines in detail approximate fixed point theory in different classes of topological spaces for general classes of maps. It offers a comprehensive treatment of the subject that is up-to-date, self-contained, and rich in methods, for a wide variety of topologies and maps. Content includes known and recent results in topology (with proofs), as well as recent results in approximate fixed point theory. This work starts with a set of basic notions in topological spaces. Special attention is given to topological vector spaces, locally convex spaces, Banach spaces, and ultrametric spaces. Sequences and function spaces—and fundamental properties of their topologies—are also covered. The reader will find discussions on fundamental principles, namely the Hahn-Banach theorem on extensions of linear (bounded) functionals; the Banach open mapping theorem; the Banach-Steinhaus uniform boundedness principle; and

Baire categories, including some applications. Also included are weak topologies and their properties, in particular the theorems of Eberlein-Smulian, Goldstine, Kakutani, James and Grothendieck, reflexive Banach spaces, l_1 -sequences, Rosenthal's theorem, sequential properties of the weak topology in a Banach space and weak* topology of its dual, and the Fréchet-Urysohn property. The subsequent chapters cover various almost fixed point results, discussing how to reach or approximate the unique fixed point of a strictly contractive mapping of a spherically complete ultrametric space. They also introduce synthetic approaches to fixed point problems involving regular-global-inf functions. The book finishes with a study of problems involving approximate fixed point property on an ambient space with different topologies. By providing appropriate background and up-to-date research results, this book can greatly benefit graduate students and mathematicians seeking to advance in topology and fixed point theory.

Fixed Point Theory in Modular Function Spaces - Mohamed A. Khamsi 2015-03-24

This monograph provides a concise introduction to the main results and methods of the fixed point theory in modular function spaces. Modular function spaces are natural generalizations of both function and sequence variants of many important spaces like Lebesgue, Orlicz, Musielak-Orlicz, Lorentz, Orlicz-Lorentz, Calderon-Lozanovskii spaces, and others. In most cases, particularly in applications to integral operators, approximation and fixed point results, modular type conditions are much more natural and can be more easily verified than their metric or norm counterparts. There are also important results that can be proved only using the apparatus of modular function spaces. The material is presented in a systematic and rigorous manner that allows readers to grasp the key ideas and to gain a working knowledge of the theory. Despite the fact that the work is largely self-contained, extensive bibliographic references are included, and open problems and further development directions are suggested when applicable. The monograph is targeted mainly at the mathematical research community but it is also accessible to graduate students interested in functional analysis and its

applications. It could also serve as a text for an advanced course in fixed point theory of mappings acting in modular function spaces.

An Introduction to Nonlinear Analysis and Fixed Point Theory - Hemant Kumar Pathak 2018-05-19

This book systematically introduces the theory of nonlinear analysis, providing an overview of topics such as geometry of Banach spaces, differential calculus in Banach spaces, monotone operators, and fixed point theorems. It also discusses degree theory, nonlinear matrix equations, control theory, differential and integral equations, and inclusions. The book presents surjectivity theorems, variational inequalities, stochastic game theory and mathematical biology, along with a large number of applications of these theories in various other disciplines. Nonlinear analysis is characterised by its applications in numerous interdisciplinary fields, ranging from engineering to space science, hydromechanics to astrophysics, chemistry to biology, theoretical mechanics to biomechanics and economics to stochastic game theory. Organised into ten chapters, the book shows the elegance of the subject and its deep-rooted concepts and techniques, which provide the tools for developing more realistic and accurate models for a variety of phenomena encountered in diverse applied fields. It is intended for graduate and undergraduate students of mathematics and engineering who are familiar with discrete mathematical structures, differential and integral equations, operator theory, measure theory, Banach and Hilbert spaces, locally convex topological vector spaces, and linear functional analysis.

Higher-Order Fixed Point Theory in Partial Metric Spaces: Some Results Generalizing the Hardy-Rogers Map - Clement Ampadu

Fixed Point Theory in Metric Type Spaces - Ravi P. Agarwal 2018-04-19

Written by a team of leading experts in the field, this volume presents a self-contained account of the theory, techniques and results in metric type spaces (in particular in G-metric spaces); that is, the text approaches this important area of fixed point analysis beginning from the basic ideas of metric space topology. The text is structured so that it

leads the reader from preliminaries and historical notes on metric spaces (in particular G-metric spaces) and on mappings, to Banach type contraction theorems in metric type spaces, fixed point theory in partially ordered G-metric spaces, fixed point theory for expansive mappings in metric type spaces, generalizations, present results and techniques in a very general abstract setting and framework. Fixed point theory is one of the major research areas in nonlinear analysis. This is partly due to the fact that in many real world problems fixed point theory is the basic mathematical tool used to establish the existence of solutions to problems which arise naturally in applications. As a result, fixed point theory is an important area of study in pure and applied mathematics and it is a flourishing area of research.

Metric Structures and Fixed Point Theory - Dhananjay Gopal
2022-04-07

It is an indisputable argument that the formulation of metrics (by Fréchet in the early 1900s) opened a new subject in mathematics called non-linear analysis after the appearance of Banach's fixed point theorem. Because the underlying space of this theorem is a metric space, the theory that developed following its publication is known as metric fixed point theory. It is well known that metric fixed point theory provides essential tools for solving problems arising in various branches of mathematics and other sciences such as split feasibility problems, variational inequality problems, non-linear optimization problems, equilibrium problems, selection and matching problems, and problems of proving the existence of solutions of integral and differential equations are closely related to fixed point theory. For this reason, many people over the past seventy years have tried to generalize the definition of metric space and corresponding fixed point theory. This trend still continues. A few questions lying at the heart of the theory remain open and there are many unanswered questions regarding the limits to which the theory may be extended. Metric Structures and Fixed Point Theory provides an extensive understanding and the latest updates on the subject. The book not only shows diversified aspects of popular generalizations of metric spaces such as symmetric, b-metric, w-distance,

G-metric, modular metric, probabilistic metric, fuzzy metric, graphical metric and corresponding fixed point theory but also motivates work on existing open problems on the subject. Each of the nine chapters—contributed by various authors—contains an Introduction section which summarizes the material needed to read the chapter independently of the others and contains the necessary background, several examples, and comprehensive literature to comprehend the concepts presented therein. This is helpful for those who want to pursue their research career in metric fixed point theory and its related areas. Features Explores the latest research and developments in fixed point theory on the most popular generalizations of metric spaces Description of various generalizations of metric spaces Very new topics on fixed point theory in graphical and modular metric spaces Enriched with examples and open problems This book serves as a reference for scientific investigators who need to analyze a simple and direct presentation of the fundamentals of the theory of metric fixed points. It may also be used as a text book for postgraduate and research students who are trying to derive future research scope in this area.

Fixed Point Theory and Related Topics - Hsien-ChungWu 2020-03-13
Fixed point theory arose from the Banach contraction principle and has been studied for a long time. Its application mostly relies on the existence of solutions to mathematical problems that are formulated from economics and engineering. After the existence of the solutions is guaranteed, the numerical methodology will be established to obtain the approximated solution. Fixed points of function depend heavily on the considered spaces that are defined using the intuitive axioms. In particular, variant metrics spaces are proposed, like a partial metric space, b-metric space, fuzzy metric space and probabilistic metric space, etc. Different spaces will result in different types of fixed point theorems. In other words, there are a lot of different types of fixed point theorems in the literature. Therefore, this Special Issue welcomes survey articles. Articles that unify the different types of fixed point theorems are also very welcome. The topics of this Special Issue include the following:
Fixed point theorems in metric space Fixed point theorems in fuzzy

metric space Fixed point theorems in probabilistic metric space Fixed point theorems of set-valued functions in various spaces The existence of solutions in game theory The existence of solutions for equilibrium problems The existence of solutions of differential equations The existence of solutions of integral equations Numerical methods for obtaining the approximated fixed points

Fixed Point Theory and Its Applications to Real World Problems - Anita Tomar 2021

"Fixed-point theory initially emerged in the article demonstrating existence of solutions of differential equations, which appeared in the second quarter of the 18th century (Joseph Liouville, 1837). Later on, this technique was improved as a method of successive approximations (Charles Emile Picard, 1890) which was extracted and abstracted as a fixed-point theorem in the framework of complete normed space (Stefan Banach, 1922). It ensures presence as well as uniqueness of a fixed point, gives an approximate technique to really locate the fixed point and the a priori and a posteriori estimates for the rate of convergence. It is an essential device in the theory of metric spaces. Subsequently, it is stated that fixed-point theory is initiated by Stefan Banach. Fixed-point theorems give adequate conditions under which there exists a fixed point for a given function and enable us to ensure the existence of a solution of the original problem. In an extensive variety of scientific issues, beginning from different branches of mathematics, the existence of a solution is comparable to the existence of a fixed point for a suitable mapping. The book "Fixed Point Theory & its Applications to Real World Problems" is an endeavour to present results in fixed point theory which are extensions, improvements and generalizations of classical and recent results in this area and touches on distinct research directions within the metric fixed-point theory. It provides new openings for further exploration and makes for an easily accessible source of knowledge. This book is apposite for young researchers who want to pursue their research in fixed-point theory and is the latest in the field, giving new techniques for the existence of a superior fixed point, a fixed point, a near fixed point, a fixed circle, a near fixed interval circle, a fixed disc, a

near fixed interval disc, a coincidence point, a common fixed point, a coupled common fixed point, amiable fixed sets, strong coupled fixed points and so on, utilizing minimal conditions. It offers novel applications besides traditional applications which are applicable to real world problems. The book is self-contained and unified which will serve as a reference book to researchers who are in search of novel ideas. It will be a valued addition to the library"--

A Study on Fixed Point Theory - Vishal Gupta 2012-06

The book entitled "A STUDY ON METRIC FIXED POINT THEORY" has been written with a prime objective to take care of fast paced development in the knowledge of the Fixed Point Theory applied on Metric Spaces. This book explains those concepts of this theory which are helpful for the reader to understand the topics easily. Each topic of this book has been written in an easy and lucid manner with emphasis that concept and terminology should be introduced well before they used. At present time, Metric Fixed Point Theory has a vast area of applications in other subjects, so this text contain the basic concept like Metric Space, 2-Metric Spaces, Compatible mapping, Complete metric spaces, Symmetric spaces, Integral type contractive condition and many more. Our aim through this book is to increase the interest of researcher towards this theory and to develop the Fixed Point Theory for further research.

Fixed Point Theory for Lipschitzian-type Mappings with Applications - Ravi P. Agarwal 2009-06-12

In recent years, the fixed point theory of Lipschitzian-type mappings has rapidly grown into an important field of study in both pure and applied mathematics. It has become one of the most essential tools in nonlinear functional analysis. This self-contained book provides the first systematic presentation of Lipschitzian-type mappings in metric and Banach spaces. The first chapter covers some basic properties of metric and Banach spaces. Geometric considerations of underlying spaces play a prominent role in developing and understanding the theory. The next two chapters provide background in terms of convexity, smoothness and geometric coefficients of Banach spaces including duality mappings and metric

projection mappings. This is followed by results on existence of fixed points, approximation of fixed points by iterative methods and strong convergence theorems. The final chapter explores several applicable problems arising in related fields. This book can be used as a textbook and as a reference for graduate students, researchers and applied mathematicians working in nonlinear functional analysis, operator theory, approximations by iteration theory, convexity and related geometric topics, and best approximation theory.

Fixed Point Theory in Probabilistic Metric Spaces - O. Hadzic
2013-06-29

Fixed point theory in probabilistic metric spaces can be considered as a part of Probabilistic Analysis, which is a very dynamic area of mathematical research. A primary aim of this monograph is to stimulate interest among scientists and students in this fascinating field. The text is self-contained for a reader with a modest knowledge of the metric fixed point theory. Several themes run through this book. The first is the theory of triangular norms (t-norms), which is closely related to fixed point theory in probabilistic metric spaces. Its recent development has had a strong influence upon the fixed point theory in probabilistic metric spaces. In Chapter 1 some basic properties of t-norms are presented and several special classes of t-norms are investigated. Chapter 2 is an overview of some basic definitions and examples from the theory of probabilistic metric spaces. Chapters 3, 4, and 5 deal with some single-valued and multi-valued probabilistic versions of the Banach contraction principle. In Chapter 6, some basic results in locally convex topological vector spaces are used and applied to fixed point theory in vector spaces. Audience: The book will be of value to graduate students, researchers, and applied mathematicians working in nonlinear analysis and probabilistic metric spaces.

[A Study On Fixed Point Theory](#) - Ph. Suranjoy Singh 2013

Fixed point theory is an attractive and interesting subject with a large number of applications in various fields of mathematics and other branches of science. Fixed point theory is divided into three major types: i) Topological Fixed Point Theory ii) Metric Fixed Point Theory iii) Order-

Theoretic Fixed Point Theory. Fixed point theory has become not only a field with a huge development but also a very helpful means for solving various problems in different fields of mathematics. Fixed point theorems are used for proving the existence and uniqueness to differential, integral and partial differential equations and variational inequalities etc. Above all, they are also useful in the field of computer science, image processing, artificial intelligence, decision making, population dynamics, operational research, industrial engineering, pattern recognition, medicine, group health underwriting, management and many other fields. Only a few common selected applications are provided here.

Elementary Fixed Point Theorems - P.V. Subrahmanyam 2019-01-10

This book provides a primary resource in basic fixed-point theorems due to Banach, Brouwer, Schauder and Tarski and their applications. Key topics covered include Sharkovsky's theorem on periodic points, Thron's results on the convergence of certain real iterates, Shield's common fixed theorem for a commuting family of analytic functions and Bergweiler's existence theorem on fixed points of the composition of certain meromorphic functions with transcendental entire functions. Generalizations of Tarski's theorem by Merrifield and Stein and Abian's proof of the equivalence of Bourbaki-Zermelo fixed-point theorem and the Axiom of Choice are described in the setting of posets. A detailed treatment of Ward's theory of partially ordered topological spaces culminates in Sherrer fixed-point theorem. It elaborates Manka's proof of the fixed-point property of arcwise connected hereditarily unicoherent continua, based on the connection he observed between set theory and fixed-point theory via a certain partial order. Contraction principle is provided with two proofs: one due to Palais and the other due to Barranga. Applications of the contraction principle include the proofs of algebraic Weierstrass preparation theorem, a Cauchy-Kowalevsky theorem for partial differential equations and the central limit theorem. It also provides a proof of the converse of the contraction principle due to Jachymski, a proof of fixed point theorem for continuous generalized contractions, a proof of Browder-Gohde-Kirk fixed point theorem, a proof of Stalling's generalization of Brouwer's theorem, examine Caristi's

fixed point theorem, and highlights Kakutani's theorems on common fixed points and their applications.

Fixed Point Theorems with Applications to Economics and Game Theory - Kim C. Border 1985

This book explores fixed point theorems and its uses in economics, cooperative and noncooperative games.

Fixed Point Theory in Ordered Sets and Applications - Siegfried Carl 2010-11-17

This monograph provides a unified and comprehensive treatment of an order-theoretic fixed point theory in partially ordered sets and its various useful interactions with topological structures. The material progresses systematically, by presenting the preliminaries before moving to more advanced topics. In the treatment of the applications a wide range of mathematical theories and methods from nonlinear analysis and integration theory are applied; an outline of which has been given an appendix chapter to make the book self-contained. Graduate students and researchers in nonlinear analysis, pure and applied mathematics, game theory and mathematical economics will find this book useful.

Topics in Metric Fixed Point Theory - Kazimierz Goebel 1990

Metric Fixed Point Theory has proved a flourishing area of research for many mathematicians. This book aims to offer the mathematical community an accessible, self-contained account which can be used as an introduction to the subject and its development. It will be understandable to a wide audience, including non-specialists, and provide a source of examples, references and new approaches for those currently working in the subject.

Metric Fixed Point Theory - Pradip Debnath 2022-01-04

This book collects chapters on contemporary topics on metric fixed point theory and its applications in science, engineering, fractals, and behavioral sciences. Chapters contributed by renowned researchers from across the world, this book includes several useful tools and techniques for the development of skills and expertise in the area. The book presents the study of common fixed points in a generalized metric space and fixed point results with applications in various modular metric spaces. New

insight into parametric metric spaces as well as study of variational inequalities and variational control problems have been included.

Handbook of Metric Fixed Point Theory - W.A. Kirk 2013-04-17

Metric fixed point theory encompasses the branch of fixed point theory which metric conditions on the underlying space and/or on the mappings play a fundamental role. In some sense the theory is a far-reaching outgrowth of Banach's contraction mapping principle. A natural extension of the study of contractions is the limiting case when the Lipschitz constant is allowed to equal one. Such mappings are called nonexpansive. Nonexpansive mappings arise in a variety of natural ways, for example in the study of holomorphic mappings and hyperconvex metric spaces. Because most of the spaces studied in analysis share many algebraic and topological properties as well as metric properties, there is no clear line separating metric fixed point theory from the topological or set-theoretic branch of the theory. Also, because of its metric underpinnings, metric fixed point theory has provided the motivation for the study of many geometric properties of Banach spaces. The contents of this Handbook reflect all of these facts. The purpose of the Handbook is to provide a primary resource for anyone interested in fixed point theory with a metric flavor. The goal is to provide information for those wishing to find results that might apply to their own work and for those wishing to obtain a deeper understanding of the theory. The book should be of interest to a wide range of researchers in mathematical analysis as well as to those whose primary interest is the study of fixed point theory and the underlying spaces. The level of exposition is directed to a wide audience, including students and established researchers.

Fixed Point Theory - Andrzej Granas 2013-03-09

The theory of Fixed Points is one of the most powerful tools of modern mathematics. This book contains a clear, detailed and well-organized presentation of the major results, together with an entertaining set of historical notes and an extensive bibliography describing further developments and applications. From the reviews: "I recommend this excellent volume on fixed point theory to anyone interested in this core

subject of nonlinear analysis." --MATHEMATICAL REVIEWS

Recent Advances in Fixed Point Theory and Applications - Umesh C. Gairola 2017

Fixed point theory is a growing and exciting branch of mathematics with a variety of wide applications in biological and mathematical sciences, proposing newer applications in discrete dynamics and super fractals. The present endeavour is to report the latest trend in metric fixed point theory, emphasising newer applications in numerical analysis, discrete dynamics and fractal graphics, besides traditional applications. The book is useful to a large class of readers interested in analysis, applicable mathematics and fractal graphics. The articles have been selected carefully so that the book is useful for sophomores up to senior researchers looking for new material and new ideas in the existence of fixed points, new applications and survey articles. A few chapters

included herein are formal in nature and suggest new directions of research in this area, which are especially useful to beginners in the field. The book is divided into two parts: Part I contains surveys and existence and convergence results. In Part II (Applications), various applications of fixed point theory to initial value problems, local attractivity of certain functional integral equation solutions, fractals and super-fractals, and solving equations in numerical praxis have been discussed. The present book, which is dedicated to Professor Shyam Lal Singh, consists of articles contributed by outstanding workers all over the world. Of course, some of the articles were selected from the Symposium on Fixed Point Theory and Applications (dedicated to him) held during the 19th Annual Conference Of India (10-12 November 2016), organised by Pauri Garhwal of the Department of Mathematics, H N B Garhwal (Central) University.