

<<不动点理论导论>>

图书基本信息

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前言

This book is intended as an introduction to fixed point theory and its applications. The topics treated range from fairly standard results (such as the Principle of Contraction Mapping, Brouwer's and Schauder's fixed point theorems) to the frontier of what is known, but we have not tried to achieve maximal generality in all possible directions. We hope that the references quoted may be useful for this purpose. The point of view adopted in this book is that of functional analysis; for the readers more interested in the algebraic topological point of view we have added some references at the end of the book. A knowledge of functional analysis is not a prerequisite, although a knowledge of an introductory course in functional analysis would be profitable. However, the book contains two introductory chapters, one on general topology and another on Banach and Hilbert spaces. As a special feature of these chapters we note the study of measures of noncompactness; first in the case of metric spaces, and second in the case of Banach spaces. Chapter 3 contains a detailed account of the Contraction Principle, perhaps the best known fixed point theorem. Many generalizations of the Contraction Principle are also included. We note here the connection between ideas from projective geometry and contractive mappings. After presenting some ways to compute the fixed points for contractive mappings, we discuss several applications in various areas. Chapter 4 presents Brouwer's fixed point theorem, perhaps the most important fixed point theorem. After some historical notes concerning opinions about Brouwer's proof - which have been influential for the future of the fixed point theory (Alexander and Birkhoff and Kellogg) - we present many proofs of this theorem of Brouwer, of interest to different categories of readers. Thus we present an elementary one, which requires only elementary properties of polynomials and continuous functions; another uses differential forms; still another uses differential topology; and one relies on combinatorial topology. These different proofs may be used in different ways to compute the fixed points for mappings. In this connection, some algorithms for the computation of fixed points are given.

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内容概要

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书籍目录

Editor's Preface Foreword

CHAPTER 1. Topological Spaces and Topological Linear Spaces 1.1. Metric Spaces 1.2. Compactness in Metric Spaces. Measures of Noncompactness 1.3. Baire Category Theorem 1.4. Topological Spaces 1.5. Linear Topological Spaces. Locally Convex Spaces

CHAPTER 2. Hilbert spaces and Banach spaces 2.1. Normed Spaces. Banach Spaces 2.2. Hilbert Spaces 2.3. Convergence in X , X^* and $L(X)$ 2.4. The Adjoint of an Operator 2.5. Classes of Banach Spaces 2.6. Measures of Noncompactness in Banach Spaces 2.7. Classes of Special Operators on Banach Spaces

CHAPTER 3. The Contraction Principle 3.0. Introduction 3.1. The Principle of Contraction Mapping in Complete Metric Spaces 3.2. Linear Operators and Contraction Mappings 3.3. Some Generalizations of the Contraction Mappings 3.4. Hilbert's Projective Metric and Mappings of Contractive Type 3.5. Approximate Iteration 3.6. A Converse of the Contraction Principle 3.7. Some Applications of the Contraction Principle

CHAPTER 4. Brouwer's Fixed Point Theorem 4.0. Introduction 4.1. The Fixed Point Property 4.2. Brouwer's Fixed Point theorem. Equivalent Formulations 4.3. Robbins' Complements of Brouwer's Theorem 4.4. The Borsuk-Ulam Theorem 4.5. An Elementary Proof of Brouwer's Theorem 4.6. Some Examples 4.7. Some Applications of Brouwer's Fixed Point Theorem 4.8. The Computation of Fixed Points. Scarfs Theorem

CHAPTER 5. Schauder's Fixed Point Theorem and Some Generalizations 5.0. Introduction 5.1. The Schauder Fixed Point Theorem 5.2. Darbo's Generalization of Schauder's Fixed Point Theorem 5.3. Krasnoselskii's, Rothe's and Altman's Theorems 5.4. Browder's and Fan's Generalizations of Schauder's and Tychonoff's Fixed Point Theorem 5.5. Some Applications

CHAPTER 6. Fixed Point Theorems for Nonexpansive Mappings and Related Classes of Mappings 6.0. Introduction 6.1. Nonexpansive Mappings 6.2. The Extension of Nonexpansive Mappings 6.3. Some General Properties of Nonexpansive Mappings 6.4. Nonexpansive Mappings on Some Classes of Banach Spaces 6.5. Convergence of Iterations of Nonexpansive Mappings 6.6. Classes of Mappings Related to Nonexpansive Mappings 6.7. Computation of Fixed Points for Classes of Nonexpansive Mappings 6.8. A Simple Example of a Nonexpansive Mapping on a Rotund Space Without Fixed Points

CHAPTER 7. Sequences of Mappings and Fixed Points

CHAPTER 8. Duality Mappings and Monotone Operators

CHAPTER 9. Families of Mappings and Fixed Points

CHAPTER 10. Fixed Points and Set-Valued Mappings

CHAPTER 11. Fixed Point Theorems for Mappings on PM-Spaces

CHAPTER 12. The Topological Degree

BIBLIOGRAPHY INDEX

<<不动点理论导论>>

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