

<<不动点理论导论>>

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作者：伊斯特拉泰斯库

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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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