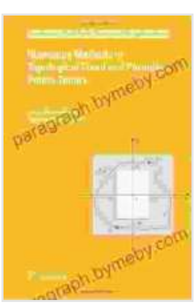
Homotopy Methods in Topological Fixed and Periodic Points Theory

Homotopy methods are a powerful tool in the study of fixed and periodic points of continuous maps. They are based on the idea of homotoping a given map to a simpler one, and then using the properties of the simpler map to deduce information about the original map.

In this article, we will provide a comprehensive overview of homotopy methods in topological fixed and periodic points theory. We will begin by introducing the basic concepts of homotopy and fixed points, and then discuss some of the most important applications of homotopy methods in this area. We will also highlight some recent advancements in the field, and provide an extensive bibliography for further reading.

Homotopy: A homotopy between two continuous maps f and g from a topological space X to a topological space Y is a continuous map F: X x [0,1] -> Y such that F(x,0) = f(x) and F(x,1) = g(x) for all x in X. We say that f and g are homotopic if there exists a homotopy between them.



Homotopy Methods in Topological Fixed and Periodic Points Theory (Topological Fixed Point Theory and Its Applications Book 3) by Jerzy Jezierski

4.8 out of 5

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Text-to-Speech	: Enabled
Screen Reader	: Supported
Print length	: 332 pages

Fixed point: A fixed point of a continuous map f: X -> X is a point x in X such that f(x) = x.

Periodic point: A periodic point of a continuous map f: X -> X is a point x in X such that f^n(x) = x for some integer n > 1, where f^n denotes the n-fold composition of f with itself.

Homotopy methods have a wide range of applications in topological fixed and periodic points theory. Some of the most important applications include:

- **Fixed point theorems:** Homotopy methods can be used to prove a variety of fixed point theorems, including the Brouwer fixed point theorem, the Schauder fixed point theorem, and the Lefschetz fixed point theorem.
- **Periodic point theorems:** Homotopy methods can also be used to prove a variety of periodic point theorems, including the Poincaré-Birkhoff theorem and the Conley-Zehnder theorem.
- **Degree theory:** Homotopy methods can be used to develop a powerful degree theory for continuous maps. This degree theory can be used to study the number of fixed points and periodic points of a map.
- **Cohomology theory:** Homotopy methods can be used to develop a cohomology theory for topological spaces. This cohomology theory

can be used to study the topological properties of a space, and to obtain information about its fixed points and periodic points.

In recent years, there have been a number of significant advancements in homotopy methods in topological fixed and periodic points theory. These advancements include:

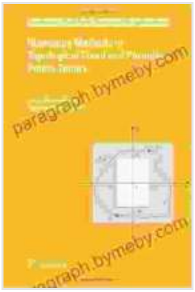
- **New fixed point theorems:** New fixed point theorems have been developed that apply to a wider class of maps and spaces. These theorems have been used to solve a number of important problems in topology and analysis.
- **New periodic point theorems:** New periodic point theorems have been developed that apply to a wider class of maps and spaces. These theorems have been used to study the dynamics of a variety of systems, including chaotic systems and Hamiltonian systems.
- **New degree theory:** New degree theory results have been developed that extend the classical degree theory to a wider class of maps and spaces. These results have been used to study the number of fixed points and periodic points of a map, and to obtain information about the topological properties of a space.
- **New cohomology theory:** New cohomology theory results have been developed that extend the classical cohomology theory to a wider class of spaces. These results have been used to study the topological properties of a space, and to obtain information about its fixed points and periodic points.

For further reading, we recommend the following references:

- [1] V. I. Arnold, "Mathematical Methods of Classical Mechanics," Springer-Verlag, New York, 1978.
- [2] R. F. Brown, "Topology and Groupoids," Birkhäuser, Basel, 1988.
- [3] K. C. Chang, "Fixed Point Theory," Springer-Verlag, New York, 1993.
- [4] A. Granas and J. Dugundji, "Fixed Point Theory," Springer-Verlag, New York, 2003.
- [5] J. W. Milnor, "Topology from the Differentiable Viewpoint," Princeton University Press, Princeton, 1965.
- [6] R. Palais, "Foundations of Global Nonlinear Analysis," Benjamin, New York, 1968.
- [7] J. T. Schwartz, "Nonlinear Functional Analysis," Gordon and Breach, New York, 1969.

Homotopy methods are a powerful tool in the study of fixed and periodic points of continuous maps. They have a wide range of applications, and have been used to solve a number of important problems in topology and analysis. In recent years, there have been a number of significant advancements in homotopy methods in topological fixed and periodic points theory, which have extended the applicability of these methods to a wider class of maps and spaces.

We hope that this article has provided you with a comprehensive overview of homotopy methods in topological fixed and periodic points theory. For further reading, we recommend the references listed in the bibliography.



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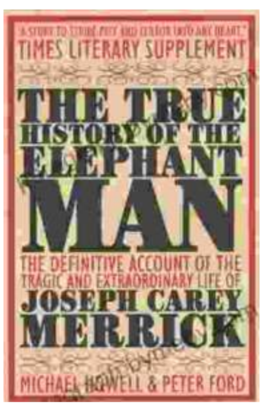

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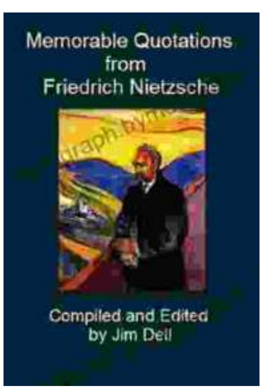

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