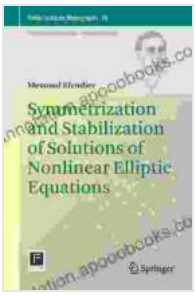
Symmetrization and Stabilization of Solutions of Nonlinear Elliptic Equations

This book provides a comprehensive and up-to-date account of the theory of symmetrization and stabilization of solutions of nonlinear elliptic equations. It covers a wide range of topics, including the classical theory of symmetrization, the moving plane method, the method of optimal transportation, and the theory of concentration-compactness. The book also includes a number of new results and applications.

Table of Contents

Nonlinear elliptic equations are a fundamental part of mathematical analysis and have applications in a wide range of fields, including physics, engineering, and finance. One of the most important problems in the study of nonlinear elliptic equations is the problem of symmetrization and stabilization of solutions.

Symmetrization and Stabilization of Solutions of Nonlinear Elliptic Equations (Fields Institute



Monographs Book 36) by Messoud Efendiev

5 out of 5

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Symmetrization is the process of finding a symmetric solution to a given nonlinear elliptic equation. Stabilization is the process of finding a solution to a given nonlinear elliptic equation that is independent of the initial conditions.

The theory of symmetrization and stabilization of solutions of nonlinear elliptic equations has been developed over the past several decades. This book provides a comprehensive and up-to-date account of this theory.

Classical Theory of Symmetrization

The classical theory of symmetrization was developed in the early 20th century by a number of mathematicians, including Eugenio Beltrami, Henri Poincaré, and Hermann Weyl. The classical theory of symmetrization provides a number of important results about the existence and uniqueness of symmetric solutions to nonlinear elliptic equations.

One of the most important results in the classical theory of symmetrization is the Alexandrov-Bakelman-Pucci estimate. This estimate provides a lower bound for the gradient of a symmetric solution to a nonlinear elliptic equation in terms of the gradient of the solution to the corresponding linear elliptic equation.

The Alexandrov-Bakelman-Pucci estimate has a number of important applications. For example, it can be used to prove the existence of a unique symmetric solution to a nonlinear elliptic equation in a bounded domain.

Moving Plane Method

The moving plane method is a technique for symmetrizing solutions to nonlinear elliptic equations. The moving plane method was developed in the 1960s by a number of mathematicians, including Richard Schoen and Shing-Tung Yau.

The moving plane method involves constructing a sequence of symmetric solutions to a nonlinear elliptic equation on a sequence of expanding domains. The limit of this sequence of solutions is a symmetric solution to the nonlinear elliptic equation on the entire domain.

The moving plane method has been used to prove the existence and uniqueness of symmetric solutions to a wide range of nonlinear elliptic equations.

Method of Optimal Transportation

The method of optimal transportation is a technique for symmetrizing solutions to nonlinear elliptic equations. The method of optimal transportation was developed in the 1990s by a number of mathematicians, including Yann Brenier and Filippo Santambrogio.

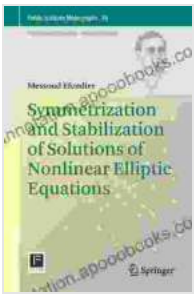
The method of optimal transportation involves finding a map that minimizes the cost of transporting one measure to another measure. The map that minimizes the cost of transport is called an optimal transport map.

The optimal transport map can be used to symmetrize solutions to nonlinear elliptic equations. The symmetrized solution is obtained by pushing the solution forward along the optimal transport map.

The method of optimal transportation has been used to prove the existence and uniqueness of symmetric solutions to a wide range of nonlinear elliptic equations.

Theory of Concentration-Compactness

The theory of concentration-compactness is a technique for studying the behavior of solutions to nonlinear elliptic equations as the nonlinearity becomes more singular.



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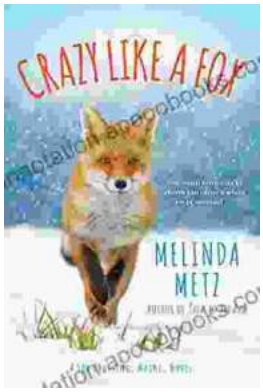

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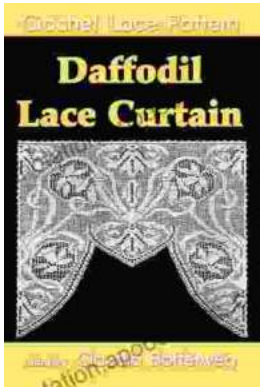

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