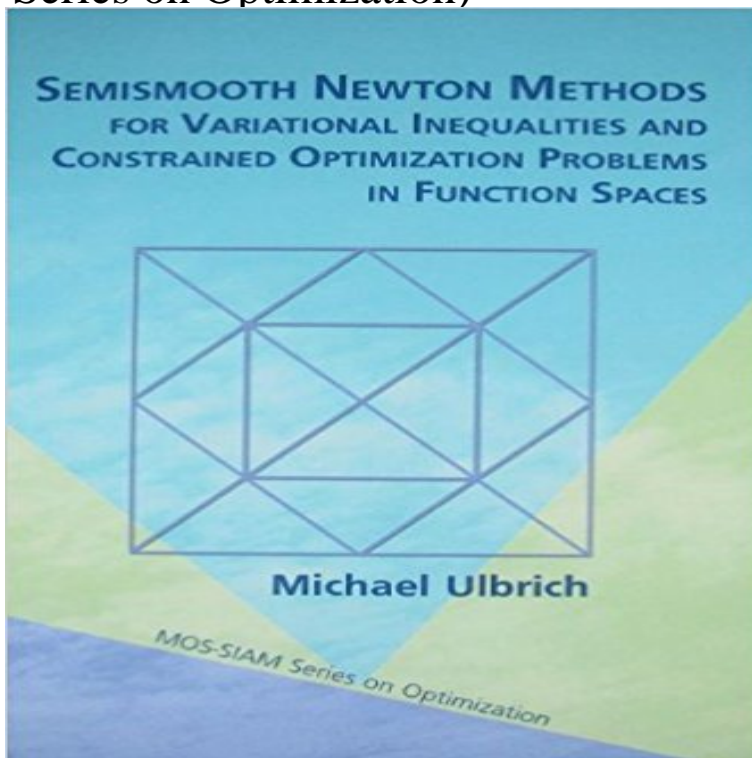


Semismooth Newton Methods for Variational Inequalities and Constrained Optimization Problems in Function Spaces (MPS-SIAM Series on Optimization)



Semismooth Newton methods are a modern class of remarkably powerful and versatile algorithms for solving constrained optimization problems with partial differential equations (PDEs), variational inequalities, and related problems. This book provides a comprehensive presentation of these methods in function spaces, striking a balance between thoroughly developed theory and numerical applications. Although largely self-contained, the book also covers recent developments in the field, such as state-constrained problems and offers new material on topics such as improved mesh independence results. The theory and methods are applied to a range of practically important problems, including optimal control of semilinear elliptic differential equations, obstacle problems, and flow control of instationary Navier-Stokes fluids. In addition, the author covers adjoint-based derivative computation and the efficient solution of Newton systems by multigrid and preconditioned iterative methods.

Audience: This book is appropriate for researchers and practitioners in PDE-constrained optimization, nonlinear optimization, and numerical analysis, as well as engineers interested in the current theory and methods for solving variational inequalities. It is also suitable as a text for an advanced graduate-level course in the aforementioned topics or applied functional analysis.

Contents: Notation; Preface; Chapter One: Introduction; Chapter Two: Elements of Finite-Dimensional Nonsmooth Analysis; Chapter Three: Newton Methods for Semismooth Operator Equations; Chapter Four: Smoothing Steps and Regularity Conditions; Chapter Five: Variational Inequalities and Mixed Problems; Chapter Six: Mesh Independence; Chapter Seven: Trust-Region Globalization; Chapter Eight: State-Constrained and Related Problems;

Chapter Nine: Several Applications;
Chapter Ten: Optimal Control of
Incompressible Navier-Stokes Flow;
Chapter Eleven: Optimal Control of
Compressible Navier-Stokes Flow;
Appendix; Bibliography; Index.

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Ulbrich, Semismooth Newton Methods for Variational Inequalities and Constrained Optimization Problems in Function Spaces. Vol. 11 of MOS-SIAM Series on Optimization. **Semismooth Newton Methods for Variational Inequalities and** Global convergence of the algorithm is demonstrated in function space and MPS-SIAM Series on Optimization. Hintermuller, M., Kunisch, K.: Path-following methods for a class of constrained minimization problems in function space. semi-smooth Newton methods for optimal

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