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Nota di contenuto	Dynamical Systems Method and Applications: Theoretical Developments and Numerical Examples; CONTENTS; List of Figures; List of Tables; Preface; Acknowledgments; PART I; 1 Introduction; 1.1 What this book is about; 1.2 What the DSM (Dynamical Systems Method) is; 1.3 The scope of the DSM; 1.4 A discussion of DSM; 1.5 Motivations; 2 Ill-posed problems; 2.1 Basic definitions. Examples; 2.2 Variational regularization; 2.3 Quasi-solutions; 2.4 Iterative regularization; 2.5 Quasi-inversion; 2.6 Dynamical systems method (DSM); 2.7 Variational regularization for nonlinear equations 3 DSM for well-posed problems3.1 Every solvable well-posed problem can be solved by DSM; 3.2 DSM and Newton-type methods; 3.3 DSM and the modified Newton's method; 3.4 DSM and Gauss-Newton-type methods; 3.5 DSM and the gradient method; 3.6 DSM and the simple iterations method; 3.7 DSM and minimization methods; 3.8 Ulm's method; 4 DSM and linear ill-posed problems; 4.1 Equations with bounded operators; 4.2 Another approach; 4.3 Equations with unbounded operators; 4.4 Iterative methods; 4.5 Stable calculation of values of unbounded operators; 5 Some inequalities

5.1 Basic nonlinear differential inequality; 5.2 An operator inequality; 5.3 A nonlinear inequality; 5.4 The Gronwall-type inequalities; 5.5 Another operator inequality; 5.6 A generalized version of the basic nonlinear inequality; 5.6.1 Formulations and results; 5.6.2 Applications; 5.7 Some nonlinear inequalities and applications; 5.7.1 Formulations and results; 5.7.2 Applications; 6 DSM for monotone operators; 6.1 Auxiliary results; 6.2 Formulation of the results and proofs; 6.3 The case of noisy data; 7 DSM for general nonlinear operator equations  
7.1 Formulation of the problem. The results and proofs; 7.2 Noisy data; 7.3 Iterative solution; 7.4 Stability of the iterative solution; 8 DSM for operators satisfying a spectral assumption; 8.1 Spectral assumption; 8.2 Existence of a solution to a nonlinear equation; 9 DSM in Banach spaces; 9.1 Well-posed problems; 9.2 Ill-posed problems; 9.3 Singular perturbation problem; 10 DSM and Newton-type methods without inversion of the derivative; 10.1 Well-posed problems; 10.2 Ill-posed problems; 11 DSM and unbounded operators; 11.1 Statement of the problem; 11.2 Ill-posed problems  
12 DSM and nonsmooth operators; 12.1 Formulation of the results; 12.2 Proofs; 13 DSM as a theoretical tool; 13.1 Surjectivity of nonlinear maps; 13.2 When is a local homeomorphism a global one?; 14 DSM and iterative methods; 14.1 Introduction; 14.2 Iterative solution of well-posed problems; 14.3 Iterative solution of ill-posed equations with monotone operator; 14.4 Iterative methods for solving nonlinear equations; 14.5 Ill-posed problems; 15 Numerical problems arising in applications; 15.1 Stable numerical differentiation; 15.2 Stable differentiation of piecewise-smooth functions  
15.3 Simultaneous approximation of a function and its derivative by interpolation polynomials

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## Sommario/riassunto

Demonstrates the application of DSM to solve a broad range of operator equations The dynamical systems method (DSM) is a powerful computational method for solving operator equations. With this book as their guide, readers will master the application of DSM to solve a variety of linear and nonlinear problems as well as ill-posed and well-posed problems. The authors offer a clear, step-by-step, systematic development of DSM that enables readers to grasp the method's underlying logic and its numerous applications. Dynamical Systems Method and Applications begins with a general i

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