

Special Issue Reprint

Numerical Methods for Solving Nonlinear Equations

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Numerical Methods For Nonlinear Algebraic Equations

Kenneth J. Beers



Numerical Methods For Nonlinear Algebraic Equations:

Numerical Methods for Nonlinear Algebraic Equations Philip Rabinowitz, British Computer Society. Numerical Analysis Specialist Group, 1970 **Numerical Methods for Nonlinear Algebraic Equations** Philip Rabinowitz, 1970

Numerical Solution of Systems of Nonlinear Algebraic Equations George D. Byrne, Charles A. Hall, 2014-05-10
Numerical Solution of Systems of Nonlinear Algebraic Equations contains invited lectures of the NSF CBMS Regional Conference on the Numerical Solution of Nonlinear Algebraic Systems with Applications to Problems in Physics Engineering and Economics held on July 10-14, 1972. This book is composed of 10 chapters and begins with the concepts of nonlinear algebraic equations in continuum mechanics. The succeeding chapters deal with the numerical solution of quasilinear elliptic equations, the nonlinear systems in semi-infinite programming, and the solution of large systems of linear algebraic equations. These topics are followed by a survey of some computational techniques for the nonlinear least squares problem. The remaining chapters explore the problem of nonlinear functional minimization, the modification methods, and the computer-oriented algorithms for solving systems. These chapters also examine the principles of contractor theory of solving equations. This book will prove useful to undergraduate and graduate students. Numerical Methods for Nonlinear Partial Differential Equations Sören Bartels, 2015-01-19
The description of many interesting phenomena in science and engineering leads to infinite-dimensional minimization or evolution problems that define nonlinear partial differential equations. While the development and analysis of numerical methods for linear partial differential equations is nearly complete, only few results are available in the case of nonlinear equations. This monograph devises numerical methods for nonlinear model problems arising in the mathematical description of phase transitions, large bending problems, image processing, and inelastic material behavior. For each of these problems, the underlying mathematical model is discussed, the essential analytical properties are explained, and the proposed numerical method is rigorously analyzed. The practicality of the algorithms is illustrated by means of short implementations. *Numerical Methods for Nonlinear Algebraic Equations* British Computer Society, 1970

Numerical Methods for Nonlinear Algebraic Equations. Conference on Numerical Methods for Nonlinear Algebraic Equations Organized by the Numerical Analysis Specialist Group of the British Computer Society and Held at the University of Essex, January 6 and 7, 1969 Philip Rabinowitz, 1970 **Numerical Methods for Unconstrained Optimization and Nonlinear Equations** J. E. Dennis, Jr., Robert B. Schnabel, 1996-12-01
A complete state-of-the-art description of the methods for unconstrained optimization and systems of nonlinear equations. *Numerical Methods for Chemical Engineering* Kenneth J. Beers, 2007
Applications of numerical mathematics and scientific computing to chemical engineering. **Numerical Methods for Solving Nonlinear Equations**, 2023-10-31 **Max-Plus Methods for Nonlinear Control and Estimation** William M. McEneaney, 2006
The central focus of this book is the control of continuous-time continuous-space nonlinear systems. Using new techniques that employ the max-plus algebra, the author addresses

several classes of nonlinear control problems including nonlinear optimal control problems and nonlinear robust H_∞ control and estimation problems. Several numerical techniques are employed including a max plus eigenvector approach and an approach that avoids the curse of dimensionality. Well known dynamic programming arguments show there is a direct relationship between the solution of a control problem and the solution of a corresponding Hamilton Jacobi Bellman (HJB) partial differential equation (PDE). The max plus based methods examined in this monograph belong to an entirely new class of numerical methods for the solution of nonlinear control problems and their associated HJB PDEs; they are not equivalent to either of the more commonly used finite element or characteristic approaches. The potential advantages of the max plus based approaches lie in the fact that solution operators for nonlinear HJB problems are linear over the max plus algebra and this linearity is exploited in the construction of algorithms. The book will be of interest to applied mathematicians, engineers, and graduate students interested in the control of nonlinear systems through the implementation of recently developed numerical methods. Researchers and practitioners tangentially interested in this area will also find a readable, concise discussion of the subject through a careful selection of specific chapters and sections. Basic knowledge of control theory for systems with dynamics governed by differential equations is required.

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