

Numerical Solution of Initial-Value Problems in Differential-Algebraic Equations

K. E. Brenan
S. L. Campbell
L. R. Petzold

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Raymond E. Flanery (Jr.)



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Numerical Solution of Initial-Value Problems in Differential-Algebraic Equations K. E. Brenan, S. L. Campbell, L. R. Petzold, 1996-01-01 This book describes some of the places where differential algebraic equations DAE s occur

Numerical Methods for Ordinary Differential Equations David F. Griffiths, Desmond J. Higham, 2010-11-11
Numerical Methods for Ordinary Differential Equations is a self contained introduction to a fundamental field of numerical analysis and scientific computation Written for undergraduate students with a mathematical background this book focuses on the analysis of numerical methods without losing sight of the practical nature of the subject It covers the topics traditionally treated in a first course but also highlights new and emerging themes Chapters are broken down into lecture sized pieces motivated and illustrated by numerous theoretical and computational examples Over 200 exercises are provided and these are starred according to their degree of difficulty Solutions to all exercises are available to authorized instructors The book covers key foundation topics o Taylor series methods o Runge Kutta methods o Linear multistep methods o Convergence o Stability and a range of modern themes o Adaptive stepsize selection o Long term dynamics o Modified equations o Geometric integration o Stochastic differential equations The prerequisite of a basic university level calculus class is assumed although appropriate background results are also summarized in appendices A dedicated website for the book containing extra information can be found via www.springer.com

Numerical Solution of Initial-value Problems in Differential-algebraic Equations Kathryn Eleda Brenan, Stephen La Vern Campbell, Linda Ruth Petzold, 1989

[Numerical Solution of Ordinary Differential Equations](#) L.F. Shampine, 1994-03-01 This book is an introduction to the numerical solution of the initial value problem for a system of ordinary differential equations ODEs It describes how typical problems can be formulated in a way that permits their solution with standard codes

Numerical Methods for Initial Value Problems in Ordinary Differential Equations Simeon Ola Fatunla, 2014-05-10 Numerical Method for Initial Value Problems in Ordinary Differential Equations deals with numerical treatment of special differential equations stiff stiff oscillatory singular and discontinuous initial value problems characterized by large Lipschitz constants The book reviews the difference operators the theory of interpolation first integral mean value theorem and numerical integration algorithms The text explains the theory of one step methods the Euler scheme the inverse Euler scheme and also Richardson s extrapolation The book discusses the general theory of Runge Kutta processes including the error estimation and stepsize selection of the R K process The text evaluates the different linear multistep methods such as the explicit linear multistep methods Adams Bashforth 1883 the implicit linear multistep methods Adams Moulton scheme 1926 and the general theory of linear multistep methods The book also reviews the existing stiff codes based on the implicit semi implicit singly diagonally implicit Runge Kutta schemes the backward differentiation formulas the second derivative formulas as well as the related extrapolation processes The text is intended for undergraduates in mathematics computer science or engineering courses and for postgraduate students or

researchers in related disciplines *Numerical Solution of Initial Value Problems for Ordinary Differential Equations* ACM. Special Interest Group on Numerical Mathematics, University of Illinois. Department of Computer Science, National Science Foundation, *The Numerical Solution of Initial Value Problems in Ordinary Differential Equations* D. J. Fyfe, 1963

Numerical Solutions of Boundary Value Problems for Ordinary Differential Equations A.K. Aziz, 2014-05-10 *Numerical Solutions of Boundary Value Problems for Ordinary Differential Equations* covers the proceedings of the 1974 Symposium by the same title held at the University of Maryland Baltimore County Campus This symposium aims to bring together a number of numerical analysis involved in research in both theoretical and practical aspects of this field This text is organized into three parts encompassing 15 chapters Part I reviews the initial and boundary value problems Part II explores a large number of important results of both theoretical and practical nature of the field including discussions of the smooth and local interpolant with small K th derivative the occurrence and solution of boundary value reaction systems the posteriori error estimates and boundary problem solvers for first order systems based on deferred corrections Part III highlights the practical applications of the boundary value problems specifically a high order finite difference method for the solution of two point boundary value problems on a uniform mesh This book will prove useful to mathematicians engineers and physicists

Numerical Initial Value Problems in Ordinary Differential Equations Charles William Gear, 1971 Introduction Higher order one step methods Systems of equations and equations of order greater than one Convergence error bounds and error estimates for one step methods The choice of step size and order Extrapolation methods Multivalued or multistep methods introduction General multistep methods order and stability Multivalued methods Existence convergence and error estimates for multivalued methods Special methods for special problems Choosing a method *Practical Aspects to the Numerical Solution of Initial Value Problems in Ordinary Differential Equations* Richard William Brankin, University of Manchester. Department of Mathematics, 1993 *Studies in the Numerical Solution of Initial Value Problems in Ordinary Differential Equations* Analee Witt, 1994 Some Investigations Into the Numerical Solution of Initial Value Problems in Ordinary Differential Equations G. N. Hayden, 1976 **The Numerical Solution of Initial Value Problems in Partial Differential Equations** Douglas Quinney, 1976 **Numerical Solution of Initial Value Problems** Francis Ceschino, Jean Kuntzmann, 1966 Introduction Part 1 The single step methods Generalities on the single step methods Euler's method Taylor's series Runge Kutta method Relationships of the Runge Kutta principle with the various single step methods Runge Kutta type formulas using higher order derivatives Part 2 Multistep methods Adams method and analogues Different multistep formulas Application of the Runge Kutta principle to the multistep methods Part 3 Theoretical and practical considerations Theoretical considerations Practical considerations Numerical Solution of Ordinary Differential Equations (initial Value Problems). Ahmad Jelvehgaran Isfahani, 1975 *Multistep Multiderivative Methods for the Numerical Solution of Initial Value Problems of Ordinary Differential Equations* Rolf Jeltsch, 1976 The Numerical Solution of Ordinary and Partial

Differential Equations Granville Sewell,1988 *Numerical Solution of Initial-value Problems for Ordinary Differential Equations Using Taylor Series with Recursively Defined Coefficients* Raymond E. Flanery (Jr.),1986 **Numerical Solutions of Initial Value Problems Using Mathematica** Sujaul Chowdhury,Ponkog Kumar Das,2018-06-06 The book contains a detailed account of numerical solutions of differential equations of elementary problems of Physics using Euler and 2nd order Runge Kutta methods and Mathematica 6.0 The problems are motion under constant force free fall motion under Hooke's law force simple harmonic motion motion under combination of Hooke's law force and a velocity dependent damping force damped harmonic motion and radioactive decay law Also included are uses of Mathematica in dealing with complex numbers in solving system of linear equations in carrying out differentiation and integration and in dealing with matrices Comparing routines for the numerical solution of initial value problems of ordinary differential equations in multiple shooting Hans-Jörg Diekhoff,1976

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