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Nota di contenuto	General Linear Methods for Ordinary Differential Equations; CONTENTS; Preface; 1 Differential Equations and Systems; 1.1 The initial value problem; 1.2 Examples of differential equations and systems; 1.3 Existence and uniqueness of solutions; 1.4 Continuous dependence on initial values and the right-hand side; 1.5 Derivatives with respect to parameters and initial values; 1.6 Stability theory; 1.7 Stiff differential equations and systems; 1.8 Examples of stiff differential equations and systems; 2 Introduction to General Linear Methods; 2.1 Representation of general linear methods 2.2 Preconsistency, consistency, stage-consistency, and zero-stability 2.3 Convergence; 2.4 Order and stage order conditions; 2.5 Local discretization error of methods of high stage order; 2.6 Linear stability theory of general linear methods; 2.7 Types of general linear methods; 2.8 Illustrative examples of general linear methods; 2.8.1 Type 1: $p = r = s = 2$ and $q = 1$ or 2; 2.8.2 Type 2: $p = r = s = 2$ and $q = 1$ or 2; 2.8.3 Type 3: $p = r = s = 2$ and $q = 1$ or 2; 2.8.4 Type 4: $p = r = s = 2$ and $q = 1$ or 2; 2.9 Algebraic stability of general linear methods; 2.10 Underlying one-step method

2.11 Starting procedures2.12 Codes based on general linear methods;
3 Diagonally Implicit Multistage Integration Methods; 3.1 Representation of DIMSIMs; 3.2 Representation formulas for the coefficient matrix B; 3.3 A transformation for the analysis of DIMSIMs; 3.4 Construction of DIMSIMs of type 1; 3.5 Construction of DIMSIMs of type 2; 3.6 Construction of DIMSIMs of type 3; 3.7 Construction of DIMSIMs of type 4; 3.8 Fourier series approach to the construction of DIMSIMs of high order; 3.9 Least-squares minimization; 3.10 Examples of DIMSIMs of types 1 and 2
3.11 Nordsieck representation of DIMSIMs3.12 Representation formulas for coefficient matrices P and G; 3.13 Examples of DIMSIMs in Nordsieck form; 3.14 Regularity properties of DIMSIMs; 4 Implementation of DIMSIMs; 4.1 Variable step size formulation of DIMSIMs; 4.2 Local error estimation; 4.3 Local error estimation for large step sizes; 4.4 Construction of continuous interpolants; 4.5 Step size and order changing strategy; 4.6 Updating the vector of external approximations; 4.7 Step-control stability of DIMSIMs; 4.8 Simplified Newton iterations for implicit methods
4.9 Numerical experiments with type 1 DIMSIMs4.10 Numerical experiments with type 2 DIMSIMs; 5 Two-Step Runge-Kutta Methods; 5.1 Representation of two-step Runge-Kutta methods; 5.2 Order conditions for TSRK methods; 5.3 Derivation of order conditions up to order 6; 5.4 Analysis of TSRK methods with one stage; 5.4.1 Explicit TSRK methods: $s = l$, $p = 2$ or 3 ; 5.4.2 Implicit TSRK methods: $s = l$, $p = 2$ or 3 ; 5.5 Analysis of TSRK methods with two stages; 5.5.1 Explicit TSRK methods: $s = 2$, $p = 2$, $q = 1$ or 2 ; 5.5.2 Implicit TSRK methods: $s = 2$, $p = 2$, $q = 1$ or 2
5.5.3 Explicit TSRK methods: $s = 2$, $p = 4$ or 5

Sommario/riassunto

Learn to develop numerical methods for ordinary differential equations General Linear Methods for Ordinary Differential Equations fills a gap in the existing literature by presenting a comprehensive and up-to-date collection of recent advances and developments in the field. This book provides modern coverage of the theory, construction, and implementation of both classical and modern general linear methods for solving ordinary differential equations as they apply to a variety of related areas, including mathematics, applied science, and engineering. The author provides the theoretical foun
