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Nota di contenuto	Intro -- Foreword -- Preface -- Contents -- Chapter 1 Differential equations, numerical methods and algebraic analysis -- 1.1 Introduction -- 1.2 Differential equations -- 1.3 Examples of differential equations -- 1.4 The Euler method -- 1.5 Runge-Kutta methods -- 1.6 Multivalued methods -- 1.7 B-series analysis of numerical methods -- Chapter 2 Trees and forests -- 2.1 Introduction to trees, graphs and forests -- 2.2 Rooted trees and unrooted (free) trees -- 2.3 Forests and trees -- 2.4 Tree and forest spaces -- 2.5 Functions of trees -- 2.6 Trees, partitions and evolutions -- 2.7 Trees and stumps -- 2.8 Subtrees, supertrees and prunings -- 2.9 Antipodes of trees and forests -- Chapter 3 B-series and algebraic analysis -- 3.1 Introduction -- 3.2 Autonomous formulation and mappings -- 3.3 Frechet derivatives and Taylor series -- 3.4 Elementary differentials and B-series -- 3.5 B-series for flow_h and implicit_h -- 3.6 Elementary weights and the order of Runge-Kutta methods -- 3.7 Elementary differentials based on Kronecker products -- 3.8 Attainable values of elementary weights and differentials -- 3.9 Composition of B-series -- Chapter 4 Algebraic analysis and integration methods -- 4.1 Introduction -- 4.2 Integration methods -- 4.3 Equivalence and reducibility of Runge-Kutta methods -- 4.4 Equivalence and reducibility of integration methods -- 4.5 Compositions of Runge-

Kutta methods -- 4.7 The B-group and subgroups -- 4.8 Linear operators on B^* and B^0 -- Chapter 5 B-series and Runge-Kutta methods -- 5.1 Introduction -- 5.2 Order analysis for scalar problems -- 5.3 Stability of Runge-Kutta methods -- 5.4 Explicit Runge-Kutta methods -- 5.5 Attainable order of explicit methods -- 5.6 Implicit Runge-Kutta methods -- 5.7 Effective order methods -- Chapter 6 B-series and multivalued methods -- 6.1 Introduction. 6.2 Survey of linear multistep methods -- 6.3 Motivations for general linear methods -- 6.4 Formulation of general linear methods -- 6.5 Order of general linear methods -- 6.6 An algorithm for determining order -- Chapter 7 B-series and geometric integration -- 7.1 Introduction -- 7.2 Hamiltonian and related problems -- 7.3 Canonical and symplectic Runge-Kutta methods -- 7.4 G-symplectic methods -- 7.5 Derivation of a fourth order method -- 7.6 Construction of a sixth order method -- 7.7 Implementation -- 7.8 Numerical simulations -- 7.9 Energy preserving methods -- Answers to the exercises -- References -- Index.
