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Nota di contenuto	Preface; Contents; 1. Introduction; 1.1 Historical remarks: Different origins, different names; 1.2 DAE analysis; 1.2.1 Indices; 1.2.2 Dynamics and singularities; 1.2.3 Numerical aspects; 1.3 State vs. semistate modeling; 1.4 Formulations; 1.4.1 Input-output descriptions; 1.4.2 Leading terms; 1.4.3 Semiexplicit, semilinear and quasilinear DAEs; 1.4.3.1 Semiexplicit and semilinear DAEs; 1.4.3.2 Hessenberg DAEs; 1.4.3.3 Quasilinear DAEs; 1.5 Contents and structure of the book; Analytical aspects of DAEs; 2. Linear DAEs and projector-based methods; 2.1 Linear time-invariant DAEs 2.1.1 Matrix pencils and the Kronecker canonical form 2.1.2 Solving linear time-invariant DAEs via the KCF; 2.1.3 A glance at projector-based techniques; 2.1.3.1 Index one characterization via projectors; 2.1.3.2 Decoupling of linear time-invariant index one DAEs; 2.1.3.3 Geometrical remarks; 2.1.3.4 Higher index problems; 2.1.3.5 Some auxiliary properties of the projectors Pi and Qi; 2.2 Properly stated linear time-varying DAEs; 2.2.1 On standard form index one problems; 2.2.2 Properly stated leading terms; 2.2.3 P-projectors: Matrix chain and the tractability index; 2.2.3.1 Matrix chain

Sommario/riassunto

Differential-algebraic equations (DAEs) provide an essential tool for system modeling and analysis within different fields of applied sciences and engineering. This book addresses modeling issues and analytical properties of DAEs, together with some applications in electrical circuit theory.Beginning with elementary aspects, the author succeeds in providing a self-contained and comprehensive presentation of several advanced topics in DAE theory, such as the full characterization of linear time-varying equations via projector methods or the geometric reduction of nonlinear systems. Recent resul