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Autore	Keane A. J
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Balanced Designs; 1.6.2 Structural Strength versusWeight; 1.6.3 Aerodynamics versus Structural Strength
1.6.4 Structures versus Control1.6.5 Robustness versus Nominal Performance; 1.7 Design Automation, Evolution and Innovation; 1.7.1 Innovation; 1.7.2 Evolution; 1.7.3 Automation; 1.8 Design Search and Optimization (DSO); 1.8.1 Beginnings; 1.8.2 A Taxonomy of Optimization; 1.8.3 A Brief History of Optimization Methods; 1.8.4 The Place of Optimization in Design - Commercial Tools; 1.9 The Take-up of Computational Methods; 1.9.1 Technology Transfer; 1.9.2 Academic Design Research; 1.9.3 Socio-technical Issues; 2 Design-oriented Analysis; 2.1 GeometryModeling and Design Parameterization
2.1.1 The Role of Parameterization in Design2.1.2 Discrete and Domain Element Parameterizations; 2.1.3 NACA Airfoils; 2.1.4 Spline-based Approaches; 2.1.5 Partial Differential Equation and Other Analytical Approaches; 2.1.6 Basis Function Representation; 2.1.7 Morphing; 2.1.8 Shape Grammars; 2.1.9 Mesh-based Evolutionary Encodings; 2.1.10 CAD Tools versus Dedicated Parameterization Methods; 2.2 ComputationalMesh Generation; 2.2.1 The Function ofMeshes; 2.2.2 Mesh Types and Cell/Element/Volume Geometries; 2.2.3 Mesh Generation, Quality and Adaptation; 2.2.4 Meshless Approaches
2.3 Analysis and Design of Coupled Systems2.3.1 Interactions between Geometry De.nition, Meshing and Solvers - Parallel Computations; 2.3.2 Simple Relaxation and Newton Techniques; 2.3.3 Systems Integration, Work.ow Management, Data Transfer and Compression; 3 Elements of Numerical Optimization; 3.1 Single Variable Optimizers - Line Search; 3.1.1 Unconstrained Optimization with a Single Real Variable; 3.1.2 Optimization with a Single Discrete Variable; 3.1.3 Optimization with a Single Nonnumeric Variable; 3.2 Multivariable Optimizers; 3.2.1 Population versus Single-point Methods
3.2.2 Gradient-based Methods

Sommario/riassunto

Over the last fifty years, the ability to carry out analysis as a precursor to decision making in engineering design has increased dramatically. In particular, the advent of modern computing systems and the development of advanced numerical methods have made computational modelling a vital tool for producing optimized designs. This text explores how computer-aided analysis has revolutionized aerospace engineering, providing a comprehensive coverage of the latest technologies underpinning advanced computational design. Worked case studies and over 500 references to the primary research litera

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Autore	Wang Danwei
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Nota di contenuto	Health Monitoring of Engineering Systems -- Hybrid Systems and Hybrid Bond Graph Models -- Quantitative Hybrid Bond Graph-based Fault Detection and Isolation -- Fault Identification Techniques -- Mode Tracking Techniques -- Application of Real Time FDI and Fault Estimation to a Vehicle Steering System -- Multiple Failure Prognosis for Hybrid Systems.
Sommario/riassunto	This book systematically presents a comprehensive framework and effective techniques for in-depth analysis, clear design procedure, and efficient implementation of diagnosis and prognosis algorithms for hybrid systems. It offers an overview of the fundamentals of diagnosis\prognosis and hybrid bond graph modeling. This book also describes hybrid bond graph-based quantitative fault detection, isolation and estimation. Moreover, it also presents strategies to track the system mode and predict the remaining useful life under multiple fault condition. A real world complex hybrid system—a vehicle steering control system—is studied using the developed fault diagnosis methods to show practical significance. Readers of this book will benefit from easy-to-understand fundamentals of bond graph models, concepts of health monitoring, fault diagnosis and failure prognosis, as

well as hybrid systems. The reader will gain knowledge of fault detection and isolation in complex systems including those with hybrid nature, and will learn state-of-the-art developments in theory and technologies of fault diagnosis and failure prognosis for complex systems.