1. Record Nr. UNINA9910139958303321

Autore	Shabana Ahmed A. <1951->
Titolo	Computational dynamics [[electronic resource] /] / Ahmed A. Shabana
Pubbl/distr/stampa	Chichester, West Sussex ; ; Hoboken, : John Wiley & Sons, 2010
ISBN	1-282-37970-4 9786612379703 0-470-68685-5 0-470-68686-3
Edizione	[3rd ed.]
Descrizione fisica	1 online resource (544 p.)
Disciplina	531.11 620.104
Soggetti	Dynamics Mechanics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Computational Dynamics; CONTENTS; PREFACE; 1 INTRODUCTION; 1.1 Computational Dynamics; 1.2 Motion and Constraints; 1.3 Degrees of Freedom; 1.4 Kinematic Analysis; 1.5 Force Analysis; 1.6 Dynamic Equations and Their Different Forms; 1.7 Forward and Inverse Dynamics; 1.8 Planar and Spatial Dynamics; 1.9 Computer and Numerical Methods; 1.10 Organization, Scope, and Notations of the Book; 2 LINEAR ALGEBRA; 2.1 Matrices; 2.2 Matrix Operations; 2.3 Vectors; 2.4 Three-Dimensional Vectors; 2.5 Solution of Algebraic Equations; 2.6 Triangular Factorization; *2.7 QR Decomposition *2.8 Singular Value DecompositionProblems; 3 KINEMATICS; 3.1 Kinematics of Rigid Bodies; 3.2 Velocity Equations; 3.3 Acceleration Equations; 3.4 Kinematics of a Point Moving on a Rigid Body; 3.5 Constrained Kinematics; 3.6 Classical Kinematic Approach; 3.7 Computational Kinematic Approach; 3.8 Formulation of the Driving Constraints; 3.9 Formulation of the Joint Constraints; 3.10 Computational Methods in Kinematics; 3.11 Computer Implementation; 3.12 Kinematic Modeling and Analysis; 3.13 Concluding Remarks; Problems; 4 FORMS OF THE DYNAMIC EQUATIONS; 4.1 D'Alembert's Principle

4.2 D'Alembert's Principle and Newton-Euler Equations4.3 Constrained Dynamics; 4.4 Augmented Formulation; 4.5 Lagrange Multipliers; 4.6 Elimination of the Dependent Accelerations; 4.7 Embedding Technique; 4.8 Amalgamated Formulation; 4.9 Open-Chain Systems; 4.10 Closed-Chain Systems; 4.11 Concluding Remarks; Problems; 5 VIRTUAL WORK AND LAGRANGIAN DYNAMICS; 5.1 Virtual Displacements; 5.2 Kinematic Constraints and Coordinate Partitioning; 5.3 Virtual Work; 5.4 Examples of Force Elements; 5.5 Workless Constraints; 5.6 Principle of Virtual Work in Statics
5.7 Principle of Virtual Work in Dynamics5.8 Lagrange's Equation; 5.9 Gibbs-Appel Equation; *5.10 Hamiltonian Formulation; 5.11 Relationship between Virtual Work and Gaussian Elimination; Problems; 6 CONSTRAINED DYNAMICS; 6.1 Generalized Inertia; 6.2 Mass Matrix and Centrifugal Forces; 6.3 Equations of Motion; 6.4 System of Rigid Bodies; 6.5 Elimination of the Constraint Forces; 6.6 Lagrange Multipliers; 6.7 Constrained Dynamic Equations; 6.8 Joint Reaction Forces; 6.9 Elimination of Lagrange Multipliers; 6.10 State Space Representation; 6.11 Numerical Integration
6.12 Algorithm and Sparse Matrix Implementation6.13 Differential and Algebraic Equations; *6.14 Inverse Dynamics; *6.15 Static Analysis; Problems; 7 SPATIAL DYNAMICS; 7.1 General Displacement; 7.2 Finite Rotations; 7.3 Euler Angles; 7.4 Velocity and Acceleration; 7.5 Generalized Coordinates; 7.6 Generalized Inertia Forces; 7.7 Generalized Applied Forces; 7.8 Dynamic Equations of Motion; 7.9 Constrained Dynamics; 7.10 Formulation of the Joint Constraints; 7.11 Newton-Euler Equations; 7.12 D'Alembert's Principle; 7.13 Linear and Angular Momentum; 7.14 Recursive Methods; Problems
8 SPECIAL TOPICS IN DYNAMICS

Sommario/riassunto

Computational Dynamics, 3rd edition, thoroughly revised and updated, provides logical coverage of both theory and numerical computation techniques for practical applications. The author introduces students to this advanced topic covering the concepts, definitions and techniques used in multi-body system dynamics including essential coverage of kinematics and dynamics of motion in three dimensions. He uses analytical tools including Lagrangian and Hamiltonian methods as well as Newton-Euler Equations. An educational version of multibody computer code is now included in this new editi