1. Record Nr. UNINA9910962165103321

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Titolo	Analytical mechanics for relativity and quantum mechanics / / Oliver Davis Johns
Pubbl/distr/stampa	Oxford, : Oxford University Press, 2005
ISBN	0-19-152429-8 1-282-36571-1 1-4356-0925-5 9786612365713
Edizione	[1st ed.]
Descrizione fisica	1 online resource (618 p.)
Collana	Oxford Graduate Texts
Disciplina	530.11 531.01515
Soggetti	Mechanics, Analytic Quantum theory
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 (p. 588-590) and index.
Nota di contenuto	Contents; Dedication; Preface; Acknowledgments; PART I: INTRODUCTION: THE TRADITIONAL THEORY; 1 Basic Dynamics of Point Particles and Collections; 1.1 Newton's Space and Time; 1.2 Single Point Particle; 1.3 Collective Variables; 1.4 The Law of Momentum for Collections; 1.5 The Law of Angular Momentum for Collections; 1.6 "Derivations" of the Axioms; 1.7 The Work-Energy Theorem for Collections; 1.8 Potential and Total Energy for Collections; 1.9 The Center of Mass; 1.10 Center of Mass and Momentum; 1.11 Center of Mass and Angular Momentum; 1.12 Center of Mass and Torque 1.13 Change of Angular Momentum1.14 Center of Mass and the Work-Energy Theorems; 1.15 Center of Mass as a Point Particle; 1.16 Special Results for Rigid Bodies; 1.17 Exercises; 2 Introduction to Lagrangian Mechanics; 2.1 Configuration Space; 2.2 Newton's Second Law in Lagrangian Form; 2.3 A Simple Example; 2.4 Arbitrary Generalized Coordinates; 2.5 Generalized Velocities in the q-System; 2.6 Generalized Forces in the q-System; 2.7 The Lagrangian Expressed in the q-System; 2.8 Two Important Identities; 2.9 Invariance of the Lagrange Equations; 2.10 Relation Between Any Two Systems

2.11 More of the Simple Example2.12 Generalized Momenta in the q-System; 2.13 Ignorable Coordinates; 2.14 Some Remarks About Units; 2.15 The Generalized Energy Function; 2.16 The Generalized Energy and the Total Energy; 2.17 Velocity Dependent Potentials; 2.18 Exercises; 3 Lagrangian Theory of Constraints; 3.1 Constraints Defined; 3.2 Virtual Displacement; 3.3 Virtual Work; 3.4 Form of the Forces of Constraint; 3.5 General Lagrange Equations with Constraints; 3.6 An Alternate Notation for Holonomic Constraints; 3.7 Example of the General Method; 3.8 Reduction of Degrees of Freedom
3.9 Example of a Reduction3.10 Example of a Simpler Reduction Method; 3.11 Recovery of the Forces of Constraint; 3.12 Example of a Recovery; 3.13 Generalized Energy Theorem with Constraints; 3.14 Tractable Non-Holonomic Constraints; 3.15 Exercises; 4 Introduction to Hamiltonian Mechanics; 4.1 Phase Space; 4.2 Hamilton Equations; 4.3 An Example of the Hamilton Equations; 4.4 Non-Potential and Constraint Forces; 4.5 Reduced Hamiltonian; 4.6 Poisson Brackets; 4.7 The Schroedinger Equation; 4.8 The Ehrenfest Theorem; 4.9 Exercises; 5 The Calculus of Variations; 5.1 Paths in an N-Dimensional Space
5.2 Variations of Coordinates5.3 Variations of Functions; 5.4 Variation of a Line Integral; 5.5 Finding Extremum Paths; 5.6 Example of an Extremum Path Calculation; 5.7 Invariance and Homogeneity; 5.8 The Brachistochrone Problem; 5.9 Calculus of Variations with Constraints; 5.10 An Example with Constraints; 5.11 Reduction of Degrees of Freedom; 5.12 Example of a Reduction; 5.13 Example of a Better Reduction; 5.14 The Coordinate Parametric Method; 5.15 Comparison of the Methods; 5.16 Exercises; 6 Hamilton's Principle; 6.1 Hamilton's Principle in Lagrangian Form
6.2 Hamilton's Principle with Constraints

Sommario/riassunto

This book provides an innovative and mathematically sound treatment of the foundations of analytical mechanics and the relation of classical mechanics to relativity and quantum theory. It treats time as a transformable coordinate, and so moves the teaching of classical mechanics out of the nineteenth century and into the modern relativistic era. It also presents of classical mechanics in a way designed to assist the student's transition to quantum theory. - ;This book provides an innovative and mathematically sound treatment of the foundations of analytical mechanics and the relation of classic