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Descrizione fisica	1 online resource (848 pages)
Collana	La Matematica per il 3+2, , 2038-5757 ; ; 150
Disciplina	531.01515
Soggetti	Mathematics Mechanics, Applied Mechanics Mathematical physics Engineering Mechanics Classical Mechanics Theoretical, Mathematical and Computational Physics Mecànica analítica Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	1 The Space and Time of Classical Physics -- 2 The Spacetime of Classical Physics and Classical Kinematics -- 3 Newtonian dynamics: a conceptual critical review -- 4 Balance equations and first integrals in Mechanics -- 5 Introduction to Rigid Body Mechanics -- 6 Introduction to stability theory with applications to Mechanics -- 7 Foundations of Lagrangian Mechanics -- 8 Symmetries and conservation laws in Lagrangian Mechanics -- 9 Advanced topics in Lagrangian Mechanics -- 10 Mathematical introduction to Special Relativity and the relativistic Lagrangian formulation -- 11 Fundamentals of Hamiltonian Mechanic -- 12 Canonical Hamiltonian theory, Hamiltonian symmetries and Hamilton-Jacobi theory -- 13 Hamiltonian symplectic structures: an introduction -- 14 Complement: elements of the theory of ordinary differential equations -- 15 Complement: the physical principles at the foundations of Special Relativity -- Appendix A: elements of Topology, Analysis, Linear Algebra and Geometry -- Appendix B: advanced topics

in Differential Geometry -- Appendix C: Solutions and/or hints to suggested exercises.

Sommario/riassunto

This textbook aims at introducing readers, primarily students enrolled in undergraduate Mathematics or Physics courses, to the topics and methods of classical Mathematical Physics, including Classical Mechanics, its Lagrangian and Hamiltonian formulations, Lyapunov stability, plus the Liouville theorem and the Poincaré recurrence theorem among others. The material also rigorously covers the theory of Special Relativity. The logical-mathematical structure of the physical theories of concern is introduced in an axiomatic way, starting from a limited number of physical assumptions. Special attention is paid to themes with a major impact on Theoretical and Mathematical Physics beyond Analytical Mechanics, such as the Galilean symmetry of classical Dynamics and the Poincaré symmetry of relativistic Dynamics, the far-reaching relationship between symmetries and constants of motion, the coordinate-free nature of the underpinning mathematical objects, or the possibility of describing Dynamics in a global way while still working in local coordinates. Based on the author's established teaching experience, the text was conceived to be flexible and thus adapt to different curricula and to the needs of a wide range of students and instructors.
