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Collana	Lecture Notes of the Unione Matematica Italiana, , 1862-9113 ; ; 16
Disciplina	510 515.64 516.36 530.15
Soggetti	Mathematical physics Geometry, Differential Calculus of variations Mathematical Physics Differential Geometry Calculus of Variations and Optimal Control; Optimization
Lingua di pubblicazione	Inglese
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Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Beginning -- Notes on Differential Geometry -- Symplectic Manifolds -- Poisson brackets environment -- Cauchy Problem for H-J equations -- Calculus of Variations and Conjugate Points -- Asymptotic Theory of Oscillating Integrals -- Lusternik-Schnirelman and Morse -- Finite Exact Reductions -- Other instances -- Bibliography.
Sommario/riassunto	This is a short tract on the essentials of differential and symplectic geometry together with a basic introduction to several applications of this rich framework: analytical mechanics, the calculus of variations, conjugate points & Morse index, and other physical topics. A central feature is the systematic utilization of Lagrangian submanifolds and their Maslov-Hörmander generating functions. Following this line of thought, first introduced by Włodzimierz Tulczyjew, geometric solutions of Hamilton-Jacobi equations, Hamiltonian vector fields and canonical transformations are described by suitable Lagrangian submanifolds belonging to distinct well-defined symplectic structures. This unified

point of view has been particularly fruitful in symplectic topology, which is the modern Hamiltonian environment for the calculus of variations, yielding sharp sufficient existence conditions. This line of investigation was initiated by Claude Viterbo in 1992; here, some primary consequences of this theory are exposed in Chapter 8: aspects of Poincaré's last geometric theorem and the Arnol'd conjecture are introduced. In Chapter 7 elements of the global asymptotic treatment of the highly oscillating integrals for the Schrödinger equation are discussed: as is well known, this eventually leads to the theory of Fourier Integral Operators. This short handbook is directed toward graduate students in Mathematics and Physics and to all those who desire a quick introduction to these beautiful subjects.
