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Soggetti	Mathematical optimization System theory Control theory Aerospace engineering Astronautics Optimization Systems Theory, Control Aerospace Technology and Astronautics Astronàutica Optimització matemàtica Llibres electrònics
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Nota di contenuto	Intoduction -- Manifold dynamics, trajectory design, and control aspects -- Pontryagin's Principle for the Optimization of Escape Trajectories from Earth-Moon L2 -- AI techniques in guidance control problem and space missions -- On Emerging Guidance Control Problems in the Satellite Industry -- Artificial Intelligence Algorithm for Space Missions -- Optimization techniques for constellations with

applications in space operations -- An Integer Linear Programming Model for Earth Observation Missions -- In-orbit Servicing and Assisted Orbit Transfer Mission Planning -- Multi-stage control for launcher and landing problems -- Preliminary End-to-End Lunar Mission Design using Direct Optimization Method -- Optimal control for the moon lander: the classical problem and variants -- Optimal control problems in the presence of uncertain parameters -- Robust Minimum-fuel orbit transfers taking into account thruster under-performance -- Improved sufficient and necessary conditions in optimal control problems for aerospace problems -- Optimal Feedback Control of Astrodynamic Systems Using Solutions of the Hamilton-Jacobi-Bellman Equation -- Second-order sufficient conditions for weak local minima: general control constraints -- Multi-arc Spacecraft Trajectory Optimization.

Sommario/riassunto	The book consists of the proceedings of the workshop "New Trends and Challenges in Optimization Theory Applied to Space Engineering", held in l'Aquila (Italy), and organized by the Gran Sasso Science Institute (GSSI), on December 13-15, 2023. The main purpose of the book is to provide an overview of the most important current topics concerning optimal control in space. Optimal control theory is an exciting research area, where both new theoretical approaches and application problems come into play. The "New Trends and Challenges in Optimization Theory Applied to Space Engineering" conference brought together influential academic researchers and experts from industry and government to build bridges between their respective groups. The topics of the conference panels are selected to include the most advanced areas of interest for space applications. In line with the mission of the Gran Sasso Tech Foundation, interdisciplinary dialogue is promoted between the sciences, and different experts are encouraged to work together to identify new problems and generate new solutions. Covering a wide range of space-related topics and challenges, this conference aims to lay the foundation for a long-term collaboration between different groups of experts. A broad overview of control theory applications in space is presented, highlighting the most recent aspects, both from a theoretical and practical point of view, in particular on the following topics: - manifold dynamics, trajectory design and related control aspects; - AI techniques in guidance control problems and space missions; - optimization techniques for constellations with applications to space operations; - multi-stage control problems for launch and landing problems; - optimal control problems in the presence of uncertain parameters; - improved sufficient and necessary conditions in optimal control problems for space problems. New methods, specific mathematical models, ad hoc algorithms and heuristics, innovative mission scenarios, and advances in classical control theory are presented.