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Descrizione fisica	1 online resource (XIV, 456 p. 80 illus., 22 illus. in color.)
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Soggetti	Automatic control System theory Control theory Chemistry, Technical Automotive engineering Control and Systems Theory Systems Theory, Control Industrial Chemistry Automotive Engineering
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Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Introduction -- Discrete-Time and Sampled-Data Systems -- Nonlinear Model Predictive Control -- Infinite-Horizon Optimal Control -- Stability and Suboptimality Using Stabilizing Constraints -- Stability and Suboptimality Without Stabilizing Constraints -- Feasibility and Robustness -- Economic Nonlinear Model Predictive Control -- Distributed Nonlinear Model Predictive Control -- Variants and Extensions -- Numerical Discretization -- Numerical Optimal Control of Nonlinear Systems -- Appendix: NMPC Software Supporting This Book.
Sommario/riassunto	This book offers readers a thorough and rigorous introduction to nonlinear model predictive control (NMPC) for discrete-time and sampled-data systems. NMPC schemes with and without stabilizing

terminal constraints are detailed, and intuitive examples illustrate the performance of different NMPC variants. NMPC is interpreted as an approximation of infinite-horizon optimal control so that important properties like closed-loop stability, inverse optimality and suboptimality can be derived in a uniform manner. These results are complemented by discussions of feasibility and robustness. An introduction to nonlinear optimal control algorithms yields essential insights into how the nonlinear optimization routine—the core of any nonlinear model predictive controller—works. Accompanying software in MATLAB® and C++ (downloadable from extras.springer.com/), together with an explanatory appendix in the book itself, enables readers to perform computer experiments exploring the possibilities and limitations of NMPC. This book (second edition) has been substantially rewritten, edited and updated to reflect the significant advances that have been made since the publication of its predecessor, including: • a new chapter on economic NMPC relaxing the assumption that the running cost penalizes the distance to a pre-defined equilibrium; • a new chapter on distributed NMPC discussing methods which facilitate the control of large-scale systems by splitting up the optimization into smaller subproblems; • an extended discussion of stability and performance using approximate updates rather than full optimization; • replacement of the pivotal sufficient condition for stability without stabilizing terminal conditions with a weaker alternative and inclusion of an alternative and much simpler proof in the analysis; and • further variations and extensions in response to suggestions from readers of the first edition. Though primarily aimed at academic researchers and practitioners working in control and optimization, the text is self-contained, featuring background material on infinite-horizon optimal control and Lyapunov stability theory that also makes it accessible for graduate students in control engineering and applied mathematics.