1. Record Nr. UNINA9910483841203321

Autore	Grimble Michael J
Titolo	Nonlinear Industrial Control Systems : Optimal Polynomial Systems and State-Space Approach / / by Michael J. Grimble, Pawe Majecki
Pubbl/distr/stampa	London : , : Springer London : , : Imprint : Springer, , 2020
ISBN	1-4471-7457-7
Edizione	[1st ed. 2020.]
Descrizione fisica	1 online resource (778 pages)
Disciplina	629.8312
Soggetti	Automatic control Industrial engineering Production engineering Automotive engineering Chemical engineering Calculus of variations Control and Systems Theory Industrial and Production Engineering Automotive Engineering Industrial Chemistry/Chemical Engineering Calculus of Variations and Optimal Control; Optimization
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Part I: Background -- Introduction to Nonlinear Systems -- Nonlinear Systems Modelling and Identification -- Part II: Polynomial Systems -- Introduction to Nonlinear Generalized Minimum Variance Control -- Nonlinear Generalized Minimum Variance Control Design Issues -- Introduction to Factorised NGMV Nonlinear Controls -- H-infinity Robust Control for Nonlinear Systems -- Design Procedures in the Presence of Saturation and Other Nonlinearities -- Part III: State-space Systems -- Space Approach to NGMV Control -- Design Issues and NGMV Predictive Control -- Basic and Factorised NGMV Control of Continuous-time Systems -- Part IV: Nonlinear System Benchmarking Nonlinear Controls -- Dual Nonlinear Estimation Problems -- Neural Networks, Fuzzy Control and Learning -- Part V: Industrial Applications

-- Nonlinear Industrial Process Control Applications -- Nonlinear Automotive, Aerospace and Marine Applications.

Sommario/riassunto

Nonlinear Industrial Control Systems presents a range of mostly optimisation-based methods for severely nonlinear systems; it discusses feedforward and feedback control and tracking control systems design. The plant models and design algorithms are provided in a MATLAB® toolbox (downloadable from www.springer.com/978-1-4471-7455-4) that enable both academic examples and industrial application studies to be repeated and evaluated, taking into account practical application and implementation problems. The text makes nonlinear control theory accessible to readers having only a background in linear systems, and concentrates on real applications of nonlinear control. It covers: different ways of modelling nonlinear systems including state space, polynomial-based, linear parameter varying, state-dependent and hybrid; design techniques for nonlinear optimal control including generalised-minimum-variance, model predictive control, quadratic-Gaussian, factorised and H design methods; design philosophies that are suitable for aerospace, automotive, marine, process-control, energy systems, robotics, servo systems and manufacturing; steps in design procedures that are illustrated in design studies to define cost-functions and cope with problems such as disturbance rejection, uncertainties and integral wind-up; and baseline non-optimal control techniques such as nonlinear Smith predictors, feedback linearization, sliding mode control and nonlinear PID. Nonlinear Industrial Control Systems is valuable to engineers in industry dealing with actual nonlinear systems. It provides students with a comprehensive range of techniques and examples for solving real nonlinear control design problems.