1. Record Nr. UNINA9910437791903321

Autore	D'Andrea-Novel Brigitte
Titolo	Control theory for engineers : a primer / / Brigitte d'Andrea-Novel, Michel de Lara
Pubbl/distr/stampa	Heidelberg ; ; New York, : Springer, 2013
ISBN	3-642-34324-4
Edizione	[1st ed. 2013.]
Descrizione fisica	1 online resource (261 p.)
Collana	Environmental Science and Engineering / Environmental Engineering
Altri autori (Persone)	De LaraMichel <1961->
Disciplina	629.8
Soggetti	Control theory Systems engineering
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Part I Modelling, Dynamical Systems and Input-Output Representation -- Basics in dynamical system modelling -- Finite dimensional state-space models -- Input-output representation -- Part II Stabilization by State-Space Approach -- Stability of an equilibrium point -- Continuous-time linear dynamical systems -- Discrete-time linear dynamical systems -- Quadratic optimization and linear filtering -- Part III Disturbance Rejection and Polynomial Approach -- Polynomial representation -- Part IV Appendices -- The discrete-time stationary Riccati equation -- Laplace transform and z-transform -- Gaussian vectors -- Bode diagrams.
Sommario/riassunto	Control Theory is at the heart of information and communication technologies of complex systems. It can contribute to meeting the energy and environmental challenges we are facing. The textbook is organized in the way an engineer classically proceeds to solve a control problem, that is, elaboration of a mathematical model capturing the process behavior, analysis of this model and design of a control to achieve the desired objectives. It is divided into three Parts. The first part of the text addresses modeling aspects through state space and input-output representations. The notion of the internal state of a system (for example mechanical, thermal or electrical), as well as its description using a finite number of variables, is also emphasized. The second part is devoted to the stability analysis of an equilibrium point. The authors present classical tools for stability analysis, such as

linearization techniques and Lyapunov functions. Central to Control Theory are the notions of feedback and of closed-loop, and the third part of the textbook describes the linear control synthesis in a continuous and discrete-time framework and also in a probabilistic context. Quadratic optimization and Kalman filtering are presented, as well as the polynomial representation, a convenient approach to reject perturbations on the system without making the control law more complex. Throughout the text, different examples are developed, both in the chapters and in the exercises.