

Contents

Part I: Electrical and Mechatronical Systems

Modeling and Control of Multi-Body Mechanical Systems: Part I A Riemannian Geometry Approach	3
<i>Suguru Arimoto</i>	
Modeling and Control of Multi-Body Mechanical Systems: Part II Grasping under Rolling Contacts between Arbitrary Shapes	17
<i>Suguru Arimoto</i>	
Sliding Mode Control for a High-Speed Linear Axis Driven by Pneumatic Muscles	31
<i>Harald Aschemann, Dominik Schindele</i>	
Using Hamiltonians to Model Saturation in Space Vector Representations of AC Electrical Machines	41
<i>Duro Basic, Al Kassem Jebai, François Malrait, Philippe Martin, Pierre Rouchon</i>	
Iterative Learning Control Using Stochastic Approximation Theory with Application to a Mechatronic System.....	49
<i>Mark Butcher, Alireza Karimi</i>	
Elimination Theory for Nonlinear Parameter Estimation.....	65
<i>John Chiasson, Ahmed Oteafy</i>	

Controlling Underactuated Mechanical Systems: A Review and Open Problems	77
<i>Zhong-Ping Jiang</i>	
Time Scaling in Motion Planning and Control of Tree-Like Pendulum Structures	89
<i>Matthias Krause, Joachim Rudolph, Frank Woittennek</i>	
Mechanical Version of the CRONE Suspension	99
<i>Alain Oustaloup, Xavier Moreau</i>	
Electrostatic MEMS: Modelling, Control, and Applications	113
<i>Guchuan Zhu</i>	
 Part II: Mathematical Tools	
Flatness Characterization: Two Approaches	127
<i>Felix Antritter, Jean Lévine</i>	
Nonholonomic Mechanics, Dissipation and Quantization	141
<i>Anthony M. Bloch</i>	
Controlled Lagrangians	153
<i>Dong Eui Chang</i>	
Compensation of Input Delay for Linear, Nonlinear, Adaptive, and PDE Systems	161
<i>Miroslav Krstic</i>	
Boundary Value Problems and Convolutional Systems over Rings of Ultradistributions	179
<i>Hugues Mounier, Joachim Rudolph, Frank Woittennek</i>	
Wei-Norman Technique for Control Design of Bilinear ODE Systems with Application to Quantum Control	189
<i>Markku Niihtilä</i>	
Interval Methods for Verification and Implementation of Robust Controllers	201
<i>Andreas Rauh, Harald Aschemann</i>	
Rational Interpolation of Rigid-Body Motions	213
<i>J.M. Selig</i>	
Contact Geometry and Its Application to Control	225
<i>Peter J. Vassiliou</i>	

Part III: Chemical Processes and Life Sciences

Piecewise Affine Models of Regulatory Genetic Networks: Review and Probabilistic Interpretation	241
<i>Madalena Chaves, Jean-Luc Gouzé</i>	
A Control Engineering Model for Resolving the TGF-β Paradox in Cancer	255
<i>Seung-Wook Chung, Carlton R. Cooper, Mary C. Farach-Carson, Babatunde A. Ogunnaike</i>	
A Mathematical Model of Air-Flow Induced Regional Over-Distention during Mechanical Ventilation: Comparing Pressure-Controlled and Volume-Controlled Modes	269
<i>P.S. Crooke, A.M. Kaynar, J.R. Hotchkiss</i>	
Positive Feedbacks Contribute to the Robustness of the Cell Cycle with Respect to Molecular Noise	283
<i>Didier Gonze, Marc Hafner</i>	
Guaranteed and Randomized Methods for Stability Analysis of Uncertain Metabolic Networks	297
<i>Heinz Koeppl, Stefano Andreozzi, Ralf Steuer</i>	
Coexistence of Three Predators Competing for a Single Biotic Resource	309
<i>Claude Lobry, Tewfik Sari, Karim Yadi</i>	
Control Problems for One-Dimensional Fluids and Reactive Fluids with Moving Interfaces	323
<i>Nicolas Petit</i>	
A Port-Hamiltonian Formulation of Open Chemical Reaction Networks	339
<i>Arjan van der Schaft, Bernhard Maschke</i>	
Bifurcations of Dynamical Systems, Logistic and Gompertz Growth Laws in Processes of Aggregation	349
<i>Alex Shoshitaishvili, Andrei Raibekas</i>	
Global Uncertainty Analysis for a Model of TNF-Induced NF-κB Signalling	365
<i>Steffen Waldherr, Jan Hasenauer, Malgorzata Doszczak, Peter Scheurich, Frank Allgöwer</i>	
Author Index	379