

1. Record Nr.	UNINA9910815262603321
Titolo	Control systems : theory and applications / / Vsevolod Kuntsevich [and four others], editors
Pubbl/distr/stampa	Denmark : , : River Publishers, , [2018] 2018
ISBN	1-00-333770-8 1-003-33770-8 1-000-79452-0 87-7022-025-5
Edizione	[1st ed.]
Descrizione fisica	1 online resource (364 pages)
Disciplina	658
Soggetti	Industrial management - United States
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Preface xiii -- List of Contributors xix -- List of Figures xxiii -- List of Tables xxix -- List of Abbreviations xxxi --PART I: Theory of Automatic Control 1 Estimation of Impact of Bounded Perturbations on Nonlinear Discrete Systems 3 Vsevolod M. Kuntsevich 1.1 Introduction 3 -- 1.2 Interval Invariant Sets of Nonlinear Control Systems with Linear Constraints 4 -- 1.3 Invariant Sets of Systems with Two-Sided Nonlinear Constraints 9 -- 1.4 Invariant Sets of Systems with Norm-Based Estimates of Nonlinear Functions 12 -- 1.5 Conclusion 14 -- References 14 -- 2 Control of Moving Objects in Condition of Conflict 17 Arkadii A. Chikrii 2.1 Introduction 17 -- 2.2 Formulation of the Problem: Scheme of the Method 18 -- 2.3 Game Problems for Fractional Systems 25 -- 2.4 Fractional Conflict-Controlled Processes with Integral Block of Control 31 -- 2.5 Specific Case of Simple Matrix 33 -- 2.6 Conclusion 40 -- References 40 -- 3 Identification and Control Automation of Cognitive Maps in Impulse Process Mode 43 Vyacheslav Gubarev, Victor Romanenko and Yurii Miliavskiy 3.1 Introduction 43 -- 3.2 Cognitive Maps Identification with Full Information 46 -- 3.2.1 Parametric Identification in Deterministic Case 46 -- 3.2.2 Identification in Case with Noise 48 -- 3.2.2.1

Combinatorial method of solution	48
3.2.2.2 Identification problem solution with least squares method	51
3.2.2.3 Regularized solution of the identification problem	52
3.3 Control Automation in Cognitive Maps in Impulse Process Mode	53
3.4 Experimental Research	55
3.4.1 Research of the Algorithms of CM Incidence Matrix Identification	55
3.4.2 Automating Control of Impulse Processes in CM of Human Resources Management in IT Company	59
3.5 Conclusion	62
References	63
4 Decentralized Guaranteed Cost Inventory Control of Supply Networks with Uncertain Delays	65
Leonid M. Lyubchyk and Yuri I. Dorofiev	
4.1 Introduction	66
4.2 Problem Statement	69
4.3 Descriptor Transformation of Supply Network Model	75
4.4 Construction of Delay-Dependent Lyapunov-Krasovskii Functional	77
4.5 Guaranteed Cost Inventory Control Based on Invariant Ellipsoids Method	80
4.6 Synthesis of Guaranteed Cost Inventory Control	83
4.7 Stability Analysis of Controlled Supply Network	86
4.8 Numerical Example	89
4.9 Conclusion	93
References	93
5 Application of a Special Method of Nondimensionization in the Solution of Nonlinear Dynamics Problems	97
Maksym V. Maksymov, Olexander I. Brunetkin and Oksana B. Maksymova	
5.1 Introduction	98
5.2 Models and Modeling	98
5.2.1 Method of Nondimensionization of Mathematical Models	98
5.2.1.1 Formulation of the problem	98
5.2.1.2 Purpose and objectives of the study	100
5.2.1.3 Scheme for ensuring self-similarity by criteria for models	100
5.2.1.4 Concept of the procedure of ensuring self-similarity by criteria	103
5.2.1.5 Physical modeling	110
5.2.1.6 Examples of reduction of models to a nondimensionized form in problems of technical systems dynamics	112
5.2.2 Examples of Using the Results of Reducing Models to a Nondimensionized Form	120
5.2.2.1 Compiling data when displaying solution results	120
5.2.2.2 Approximate solution of nonlinear ordinary differential equations	120
5.3 Conclusion	139
References	140
PART II: Control Systems Applications	6
6 Energy Efficiency of Smart Control Based on Situational Models	145
Volodymyr M. Dubovoi and Mariya S. Yukhymchuk	
6.1 Introduction	145
6.2 Situation-Event Graph Model	149
6.3 Energy Loss Model	151
6.3.1 Formalizing of the Criterion of Energy Efficiency of Smart Control on the Basis of Situational Models	151
6.3.2 Development of the Method for Simulation of Systems with Smart Control Based on Situational Models in Conditions of Combined Uncertainty of the Initial Information	154
6.3.3 Development of an Algorithm for Estimating the Energy Efficiency of Situational Model-Based Smart Control	160
6.3.4 Experimental Investigations of Developed Model	161
6.4 Analysis of Simulation Results	163
6.5 Conclusion	164
References	164
7 Ellipsoidal Pose Estimation of an Uncooperative Spacecraft from Video Image Data	169
Vyacheslav F. Gubarev, Nikolay N. Salnikov and Serhii V. Melnychuk	
7.1 Introduction	169
7.2 Relative Pose Determination	171
7.3 Position and Attitude Determination by Learning	173
7.4 Informative Features of Image	175
7.5 Estimation Problem Statement	178
7.6 Method of Nonlinear Ellipsoidal Filtration	182
7.7 Estimation of Target Attitude and Angular Velocity	185
7.8 Numerical Simulation	188
7.9 Conclusion	191
References	192
8 Fuzzy Controllers for Increasing Efficiency of the Floating Dock's Operations: Design and Optimization	197
Yuriy P. Kondratenko, Oleksiy V. Kozlov and Andriy M. Topalov	
8.1 Introduction	198
8.2 Design Features of the Automatic Control Systems of the Floating Docks Main Operations	200
8.3 Combined Design Approach of the FCs for the ACSs of the Floating Docks Main Operations	205
8.4 Design of the FC for the Draft ACS of the Floating Dock for Low-Tonnage Vessels	212
8.5	

Conclusion 225 -- References 226 -- 9 Efficiency Control for Multi-assortment Production Processes Taking into Account Uncertainties and Risks 233 Anatoliy Ladaniuk, Viacheslav Ivashchuk and Jaroslav Smityukh 9.1 Introduction 234 -- 9.2 Decision-Making Under Uncertainty 236 -- 9.3 The Estimation of Stability and Accuracy of Presented Solutions 238 -- 9.4 Conclusion 241 -- References 241 -- 10 On the Coordinate Determination of Space Images by Orbital Data 245 Dmitriy V. Lebedev 10.1 Introduction 245 -- 10.2 Systems of Coordinates. Problem Statement of In-flight Calibration 247 -- 10.3 Coordinate Binding of Space Images 249 -- 10.3.1 Estimation of the Point Landmark Coordinates by Stereoshooting Results 250 -- 10.3.2 Geo-referencing of Frame Elements 251 -- 10.4 Factors Affecting the Accuracy of the Images Coordinate Reference. Assessment of the Accuracy of the Binding 253. 10.5 Algorithms of In-flight Geometric Calibration 255 --10.5.1 Calibration Algorithms Based on Photogrammetric Equations 255 -- 10.5.1.1 Algorithm 1 256 -- 10.5.1.2 Algorithm 2 257 -- 10.5.2 Calibration for a Priori Unknown Point Landmarks 257 -- 10.5.3 Calibration Using a Virtual Reference System 259 -- 10.5.4 Reduction of the Flight Calibration Algorithm 261 -- 10.6 Modeling of Algorithms of Calibration and Topographic Binding 262 -- 10.6.1 Calibration Algorithms 1 and 2 264 -- 10.6.2 Calibration of Algorithms B and R 265 -- 10.7 Conclusion 267 -- References 268 -- 11 Algorithms of Robotic Electrotechnical Complex Control in Agricultural Production 271 Vitaliy Lysenko, Igor Bolbot, Yuriy Romasevych, Viatcheslav Loveykin and Valeriy Voytiuk 11.1 Introduction 271 -- 11.2 An Overview of Recent Findings 272 -- 11.3 The Purpose of the Research 273 -- 11.4 Statement of Basic Materials 273 -- 11.4.1 Development of Upper-Level Control Algorithms 273 -- 11.4.2 Development of Control Algorithms at the Lower Level 283 -- 11.5 Conclusion 288 -- References 288 -- 12 Information Support of Some Automated Systems of Remote Monitoring of Planted Areas State 291 Vitaliy Lysenko, Serhii Shvorov, Oleksii Opryshko, Natalia Pasichnyk and Dmytro Komarchuk 12.1 Introduction 292 -- 12.2 Formulation of the Problem. Scheme of the Method 293 -- 12.2.1 Investigated Objects 293 -- 12.2.2 Hardware for Spectral Monitoring 294 -- 12.3 Obtained Results and Discussion 297 -- 12.3.1 Continuous Sowing Crops -- Wheat 297 -- 12.3.2 Growing Crops 300 -- 12.3.3 Determination of Optimal Movement Routes for Harvesters to Harvest Energy Crops and for Necessary Transport Equipment to Transport Them 302 -- 12.4 Conclusion 309 -- References 310 -- 13 Synthesis of an Optimal Combined Multivariable Stabilization System for Adsorption Process Control 315 Sergey Osadchy, Valentina Zubenko and Marja Yakoreva 13.1 Introduction 315 -- 13.2 Optimal Stabilization System Synthesis Problem Formulation 316. 13.3 Justification of Choice and Description of the Algorithm for Optimal Systems Synthesis 319 -- 13.4 Optimal Combined Stabilization System's Synthesis 321 -- 13.5 Conclusion 323 -- References 324 -- Index 325 -- About the Editors 327.

Sommario/riassunto

In recent years, a considerable amount of effort has been devoted, both in industry and academia, towards the development of advanced methods of control theory with focus on its practical implementation in various fields of human activity such as space control, robotics, control applications in marine systems, control processes in agriculture and food production. Control Systems: Theory and Applications consists of selected best papers which were presented at XXIV International conference on automatic control "Automatics 2017" (September 13-15, 2017, Kyiv, Ukraine) organized by Ukrainian Association on Automatic Control (National member organization of IFAC - International

Federation on Automatic Control) and National University of Life and Environmental Sciences of Ukraine. More than 120 presentations were discussed at the conference, with participation of the scientists from the numerous countries. The book is divided into two main parts, a first on Theory of Automatic Control (5 chapters) and the second on Control Systems Applications (8 chapters). The selected chapters provide an overview of challenges in the area of control systems design, modeling, engineering and implementation and the approaches and techniques that relevant research groups within this area are employing to try to resolve these. This book on advanced methods of control theory and successful cases in the practical implementation is ideal for personnel in modern technological processes automation and SCADA systems, robotics, space and marine industries as well as academic staff and master/research students in computerized control systems, automatized and computer-integrated systems, electrical and mechanical engineering.
