

Index

- Accessibility distribution 180–183, 188
- Adaptive synchronization 48, 49, 81, 96, 97, 106, 119, 135, 173
- Aguirre 4, 47, 49, 72, 84, 97, 174
- Almost-synchronization 178

- chaos control 1, 8
- Chaotic systems 22
- chaotification 11
- Chua circuit 70, 82, 84, 113, 115, 128, 163
- Codistribution 182
- Complete synchronization 2, 70, 76, 77, 79, 89, 90, 128, 130, 178, 179, 182, 185
- Coulomb oscillator 62, 150, 157

- Discrepancy system 56, 83, 122, 124, 126, 129, 131, 133, 134
- Discrete-time feedback 140, 144–146, 148, 150, 152, 156, 161
- Duffing equation 3, 11, 12, 19, 23, 46, 58, 59, 60, 92, 100, 128, 133, 152, 155, 163, 164, 170–172, 190
- Dynamic output feedback 124, 126, 128–131, 134

- Exact synchronization 5, 48, 70, 71, 73, 79, 115, 123, 124, 134
- exciting force 8

- Fast Fourier Transform 12
- Frequency domain 2, 7, 13
- Fully linearizable 5, 49, 112, 136

- High-gain observers 32
- Hodgkin-Huxley Neuron 31
- Hyperchaos 137

- Ideal feedback 39, 72, 76, 144, 145, 158,
- Internal model 15, 16, 140
- Involutive distribution 190

- Laplace Domain 4, 14, 17, 24, 28, 52, 54, 62, 70
- Levitation 3, 9, 38, 39, 44, 148, 157
- Lie algebra 187, 188, 192
- Lie bracket 180, 181, 189, 190
- Local coordinate transformation 180, 182, 183
- Local stability 14, 20, 55, 58, 59, 69, 90, 149
- Lorenz system 7, 11, 20, 28, 76, 79, 135, 184, 186, 194
- Low order parameterization 106, 115
- Luenberger observer 50

- Message signal 80–86, 106, 120–122, 124, 128, 130–134
- Model mismatches 69, 81, 122, 124

- observable 8
- OGY 15, 149

- Parameter modulation 10–12, 81, 87, 92, 121
- Pendulum 62–66, 150, 157

- Performance index 66, 67, 86, 132
 Phase synchronization 70, 71, 74, 171, 178
 PI controller 8, 9, 13, 16–18, 20, 22, 23, 29, 56, 57, 60
 Practical Synchronization 63, 64, 70, 73–77, 79, 88, 115, 119, 131
 Pyragas 4, 37, 47, 95, 174

 Quadratic integral 16, 26, 35, 53, 57, 60, 70

 Relative degree 23, 24, 26, 29, 31, 34, 37, 44, 47, 55, 64, 65, 74, 111, 113, 116, 134, 156, 182, 186, 192
 Robust Recursive Feedback Law 158, 159
 Robust Synchronization 2, 54, 92, 93, 95, 97, 98, 104, 116, 125
 Rulkov 15, 77, 98

 Secure communication 3, 12, 47, 48, 73, 84, 85, 92, 96, 104, 112, 113, 119, 128, 129, 131, 184
 Self-organization 140, 141, 143, 145, 163, 165, 169
 Signal transmission 85, 89, 126, 130, 135, 140

 Small Gain theorem 95, 96
 suppression 1
 Synchronizability 3, 130, 131, 182–189, 191, 192, 194
 synchronization 2
 Synchronization and suppression 53, 115, 165
 Synchronization function 191, 192, 194
 synchronization manifolds 7
 Synchronization phenomena 2, 12, 53, 64, 72, 73, 80–83, 96, 112, 128, 169, 182, 191

 Tangent space 180, 181, 183, 185, 186

 Uncertainties compensator 180, 181, 183, 185, 186
 Uncertainty estimation 45
 Unveiling 113, 152, 153

 van der Pol equation 9, 42, 43, 58, 63, 66, 104
 Windup 32, 34–36, 46

 Zero dynamics 32, 116, 120, 122, 125, 130, 133, 182

Abbreviations

ACA	Actual Control Action
APS	Almost Partial-state Synchronization
CCS	Computed Control Signal
CES	Complete Exact Synchronization
CPS	Complete Practical Synchronization
FFT	Fast Fourier Transform
FPT	Fixed Point Theorem
FLNS	Fully-Linearizable Nonlinear System
GS	Generalized Synchronization
GAS	Globally Asymptotically Stable
HSIC	High-Sensitivity of the Initial Condition
HTS	High T_c Superconductor
IFC	Ideal Feedback Control
OGY	Ott, Grebogy and Yorke
PB	Proportional Band
PII ²	Proportional-Integral-Double Integral
PSD	Power Spectrum Density
PPS	Partial state Practical Synchronization
RAF	Robust asymptotic feedback
RAS	Robust Asymptotic Stabilization
SGT	Small gain theorem
TDC	Time Discrete Coordinate

Lecture Notes in Control and Information Sciences

Edited by M. Thoma, M. Morari

Further volumes of this series can be found on our homepage:
springer.com

Vol. 378: Femat R.; Solis-Perales G.
Robust Synchronization of Chaotic Systems
via Feedback
199 p. 2008 [978-3-540-69306-2]

Vol. 377: Patan K.
Artificial Neural Networks for
the Modelling and Fault
Diagnosis of Technical Processes
206 p. 2008 [978-3-540-79871-2]

Vol. 376: Hasegawa Y.
Approximate and Noisy Realization of
Discrete-Time Dynamical Systems
245 p. 2008 [978-3-540-79433-2]

Vol. 375: Bartolini G.; Fridman L.; Pisano A.;
Usai E. (Eds.)
Modern Sliding Mode Control Theory
465 p. 2008 [978-3-540-79015-0]

Vol. 374: Huang B.; Kadali R.
Dynamic Modeling, Predictive Control
and Performance Monitoring
240 p. 2008 [978-1-84800-232-6]

Vol. 373: Wang Q.-G.; Ye Z.; Cai W.-J.;
Hang C.-C.
PID Control for Multivariable Processes
264 p. 2008 [978-3-540-78481-4]

Vol. 372: Zhou J.; Wen C.
Adaptive Backstepping Control of Uncertain
Systems
241 p. 2008 [978-3-540-77806-6]

Vol. 371: Blondel V.D.; Boyd S.P.;
Kimura H. (Eds.)
Recent Advances in Learning and Control
279 p. 2008 [978-1-84800-154-1]

Vol. 370: Lee S.; Suh I.H.;
Kim M.S. (Eds.)
Recent Progress in Robotics:
Viable Robotic Service to Human
410 p. 2008 [978-3-540-76728-2]

Vol. 369: Hirsch M.J.; Pardalos P.M.;
Murphey R.; Grundel D.
Advances in Cooperative Control and
Optimization
423 p. 2007 [978-3-540-74354-5]

Vol. 368: Chee F.; Fernando T.
Closed-Loop Control of Blood Glucose
157 p. 2007 [978-3-540-74030-8]

Vol. 367: Turner M.C.; Bates D.G. (Eds.)
Mathematical Methods for Robust and Nonlinear
Control
444 p. 2007 [978-1-84800-024-7]

Vol. 366: Bullo F.; Fujimoto K. (Eds.)
Lagrangian and Hamiltonian Methods for
Nonlinear Control 2006
398 p. 2007 [978-3-540-73889-3]

Vol. 365: Bates D.; Hagström M. (Eds.)
Nonlinear Analysis and Synthesis Techniques for
Aircraft Control
360 p. 2007 [978-3-540-73718-6]

Vol. 364: Chiuso A.; Ferrante A.;
Pinzoni S. (Eds.)
Modeling, Estimation and Control
356 p. 2007 [978-3-540-73569-4]

Vol. 363: Besançon G. (Ed.)
Nonlinear Observers and Applications
224 p. 2007 [978-3-540-73502-1]

Vol. 362: Tarn T.-J.; Chen S.-B.;
Zhou C. (Eds.)
Robotic Welding, Intelligence and Automation
562 p. 2007 [978-3-540-73373-7]

Vol. 361: Méndez-Acosta H.O.; Femat R.;
González-Álvarez V. (Eds.):
Selected Topics in Dynamics and Control of
Chemical and Biological Processes
320 p. 2007 [978-3-540-73187-0]

Vol. 360: Kozłowski K. (Ed.)
Robot Motion and Control 2007
452 p. 2007 [978-1-84628-973-6]

Vol. 359: Christophersen F.J.
Optimal Control of Constrained
Piecewise Affine Systems
190 p. 2007 [978-3-540-72700-2]

Vol. 358: Findeisen R.; Allgöwer
F.; Biegler L.T. (Eds.): Assessment and Future Di-
rections of Nonlinear
Model Predictive Control
642 p. 2007 [978-3-540-72698-2]

Vol. 357: Queinnec I.; Tarbouriech
S.; Garcia G.; Niculescu S.-I. (Eds.):
Biology and Control Theory: Current Challenges
589 p. 2007 [978-3-540-71987-8]

- Vol. 356:** Karatkevich A.:
Dynamic Analysis of Petri Net-Based Discrete Systems
166 p. 2007 [978-3-540-71464-4]
- Vol. 355:** Zhang H.; Xie L.:
Control and Estimation of Systems with Input/Output Delays
213 p. 2007 [978-3-540-71118-6]
- Vol. 354:** Witczak M.:
Modelling and Estimation Strategies for Fault Diagnosis of Non-Linear Systems
215 p. 2007 [978-3-540-71114-8]
- Vol. 353:** Bonivento C.; Isidori A.; Marconi L.; Rossi C. (Eds.)
Advances in Control Theory and Applications
305 p. 2007 [978-3-540-70700-4]
- Vol. 352:** Chiasson, J.; Loiseau, J.J. (Eds.)
Applications of Time Delay Systems
358 p. 2007 [978-3-540-49555-0]
- Vol. 351:** Lin, C.; Wang, Q.-G.; Lee, T.H., He, Y.
LMI Approach to Analysis and Control of Takagi-Sugeno Fuzzy Systems with Time Delay
204 p. 2007 [978-3-540-49552-9]
- Vol. 350:** Bandyopadhyay, B.; Manjunath, T.C.; Umapathy, M.
Modeling, Control and Implementation of Smart Structures 250 p. 2007 [978-3-540-48393-9]
- Vol. 349:** Rogers, E.T.A.; Galkowski, K.; Owens, D.H.
Control Systems Theory and Applications for Linear Repetitive Processes
482 p. 2007 [978-3-540-42663-9]
- Vol. 347:** Assawinchaichote, W.; Nguang, K.S.; Shi P.
Fuzzy Control and Filter Design for Uncertain Fuzzy Systems
188 p. 2006 [978-3-540-37011-6]
- Vol. 346:** Tarbouriech, S.; Garcia, G.; Glatfelder, A.H. (Eds.)
Advanced Strategies in Control Systems with Input and Output Constraints
480 p. 2006 [978-3-540-37009-3]
- Vol. 345:** Huang, D.-S.; Li, K.; Irwin, G.W. (Eds.)
Intelligent Computing in Signal Processing and Pattern Recognition
1179 p. 2006 [978-3-540-37257-8]
- Vol. 344:** Huang, D.-S.; Li, K.; Irwin, G.W. (Eds.)
Intelligent Control and Automation
1121 p. 2006 [978-3-540-37255-4]
- Vol. 341:** Commault, C.; Marchand, N. (Eds.)
Positive Systems
448 p. 2006 [978-3-540-34771-2]
- Vol. 340:** Diehl, M.; Mombaur, K. (Eds.)
Fast Motions in Biomechanics and Robotics
500 p. 2006 [978-3-540-36118-3]
- Vol. 339:** Alamir, M.
Stabilization of Nonlinear Systems Using Receding-horizon Control Schemes
325 p. 2006 [978-1-84628-470-0]
- Vol. 338:** Tokarzewski, J.
Finite Zeros in Discrete Time Control Systems
325 p. 2006 [978-3-540-33464-4]
- Vol. 337:** Blom, H.; Lygeros, J. (Eds.)
Stochastic Hybrid Systems
395 p. 2006 [978-3-540-33466-8]
- Vol. 336:** Pettersen, K.Y.; Gravdahl, J.T.; Nijmeijer, H. (Eds.)
Group Coordination and Cooperative Control
310 p. 2006 [978-3-540-33468-2]
- Vol. 335:** Kozłowski, K. (Ed.)
Robot Motion and Control
424 p. 2006 [978-1-84628-404-5]
- Vol. 334:** Edwards, C.; Fossas Colet, E.; Fridman, L. (Eds.)
Advances in Variable Structure and Sliding Mode Control
504 p. 2006 [978-3-540-32800-1]
- Vol. 333:** Banavar, R.N.; Sankaranarayanan, V.
Switched Finite Time Control of a Class of Underactuated Systems
99 p. 2006 [978-3-540-32799-8]
- Vol. 332:** Xu, S.; Lam, J.
Robust Control and Filtering of Singular Systems
234 p. 2006 [978-3-540-32797-4]
- Vol. 331:** Antsaklis, P.J.; Tabuada, P. (Eds.)
Networked Embedded Sensing and Control
367 p. 2006 [978-3-540-32794-3]
- Vol. 330:** Koumoutsakos, P.; Mezic, I. (Eds.)
Control of Fluid Flow
200 p. 2006 [978-3-540-25140-8]
- Vol. 329:** Francis, B.A.; Smith, M.C.; Willems, J.C. (Eds.)
Control of Uncertain Systems: Modelling, Approximation, and Design
429 p. 2006 [978-3-540-31754-8]
- Vol. 328:** Loria, A.; Lamnabhi-Lagarrigue, F.; Panteley, E. (Eds.)
Advanced Topics in Control Systems Theory
305 p. 2006 [978-1-84628-313-0]
- Vol. 327:** Fournier, J.-D.; Grimm, J.; Leblond, J.; Partington, J.R. (Eds.)
Harmonic Analysis and Rational Approximation
301 p. 2006 [978-3-540-30922-2]
- Vol. 326:** Wang, H.-S.; Yung, C.-F.; Chang, F.-R.
 H_∞ Control for Nonlinear Descriptor Systems
164 p. 2006 [978-1-84628-289-8]
- Vol. 325:** Amato, F.
Robust Control of Linear Systems Subject to Uncertain Time-Varying Parameters
180 p. 2006 [978-3-540-23950-5]