Volume 2. Control of Oscillations and Chaos

2.1. Control and Synchronization in Chaotic Systems

Noise-Enhanced Phase Synchronization of Weakly Coupled Chaotic Oscillators 353
J. Kurths, C.S. Zhou (Germany)

Experimental Characterization of the Transition to Phase Synchronization of Chaos 358
S. Boccaletti, E. Allaria, R. Meucci, and F.T. Arecchi (Italy)

Phase Synchronization in Ensembles of Coupled Phase Systems 359
V.N. Belykh (Russia)

Controlled Phase Synchronization in Oscillatory Networks 361
V.N. Belykh, G.V. Osipov (Russia), J. Kurths (Germany)

Synchronization and Stochastic Resonance of Noise-Induced Jumps in a Bistable System 372
A. Kovaleva (Russia)

2.2. Control of Chaos by Periodic Perturbations

Mechanisms of Non-Feedback Controlling Chaos and Suppression of Chaotic Motion 378
A. Loskutov, S. Rybalko (Russia)

A Novel Polynomial Method for Taming Chaos in a Wide Class of Nonlinear Oscillators 390
V.M. Preciado, R. Chacon (Spain)

Multistability in a Driven Nonlinear System Controlled by Weak Subharmonic Perturbations 396
V.N. Chizhevsky (Italy/Belarus), R. Corbalán (Spain)

Homoclinic Chaos Suppression 403
A. Loskutov, A. Janoev (Russia)

On the Stability and Vibrational Stabilization of a Class of Nonlinear Systems 410
A.Yu. Aleksandrov, A.V. Platonov (Russia)
### 2.3. Anti-Control of Chaos: Theories, Methods, and Applications

On the Modified Marotto Theorem .......................... 415
C.P. Li (China)

Switching Control for Multi-Scroll Chaos Generation: An Overview .................. 420
J.-H. Li (China), X. Yu (Australia), G. Chen (China)

Fuzzy Chaos Generators for Nonlinear Dynamical Systems .......................... 429
Z. Li (Germany)

Sustained Chaos and Control by Means of Weak Periodic Excitations: Application to a Class of Nonlinear Electronic Circuits .......................... 434
V.M. Preciado, R. Chacon (Spain), V. Tereshko (UK)

Model Based Anticontrol of Chaos .................. 440
Ö. Morgül (Turkey)

Difference Scheme with Instant Transition “from Order to Chaos” .................. 446
A.F. Goloubentsev, V.M. Anikin, Y.A. Barulina (Russia)

Chaotic Maps Generating White Noise .......................... 452
A.F. Goloubentsev, V.M. Anikin, Y.A. Barulina (Russia)

### 2.4. Control of Chaos

Time-Delayed Feedback Control Method and Unstable Controllers .................. 456
K. Pyragas (Lithuania)

Chaotification via Feedback Control: Theories, Methods, and Applications ........... 468
G. Chen (China)

Principles of Direct Chaotic Communications 475
A.S. Dmitriev, A.I. Panas, K.V. Zakharchenko (Russia)

Non-Linear Processes and Control of Chaos in Chemical Technology .................. 484
E.M. Koltsova, M.V. Cherenkov, E.Yu. Korchagin (Russia)

Stability of Delayed Feedback Controllers for Discrete Time Systems .................. 491
Ö. Morgül (Turkey)

Music and Control of Chaos in the Brain .......................... 497
V.E. Bondarenko (USA), I. Yevin (Russia)

Energy-Optimal Steering of Transitions through a Fractal Basin Boundary ................. 501
A.N. Silchenko, S. Beri, D.G. Luchinsky, P.V.E. McClintock (UK)

Application of Idea of Chaos Control to Stabilization of Stationary Generation in Backward-Wave Oscillator .................. 507
A.M. Dolov, S.P. Kuznetsov (Russia)

Robust Control of Time-Delay Chaotic Systems .......................... 510
C. Hua, X. Guan (China)

Control of Chaotic Behavior in High Order Dynamical Systems .................. 516
A. Boukabou, N. Mansouri (Algeria)

Modeling and Controlling the Heart Conductive System .......................... 522
A. Loskutov, S. Rybalko, E. Zhuchkova (Russia)

Estimation of Transport Times for Chaotic Dynamical Control Systems .................. 528
S.M. Khryashchev (Russia)

On Detection of Belonging of Two Points to One Trajectory .................. 534
A.V. Demin (Russia)

### 2.5. Synchronization

Synchronization Domains in Arrays of Chaotic Homoclinic Systems .................. 539
F.T. Arecchi, E. Allaria (Italy), I. Leyva (Italy/Spain), S. Boccaletti (Italy)

Programmable Phase Locked Loops for Digital Signal Processors .................. 548
G.A. Leonov, S.M. Seledzhi (Russia)
On the Choice of Coupling in a System of Coupled Maps: Structure Implies Features  
I. Tyukin, C. van Leeuwen (Japan)

Synchronization of Chaotic Oscillators with Type-I Intermittency  
M.V. Ivanchenko, G.V. Osipov, V.D. Shalfeev (Russia)

Phase Relations in the Synchronized Motion of Two-Pendulum System  
B.R. Andrievsky (Russia)

Parametrically Induced Stochastic Synchronization  
O.V. Sosnovtseva, V.V. Astakhov, A.V. Shabunin, P.A. Stalmakhov (Russia)

2.6. Control of Oscillations

Spatial Problems of Nonlinear Dynamics: Motivation and Analysis  
I.V. Miroshnik, E. Olkhovskaya (Russia)

Elements of Physical Oscillation and Control Theory  
S.L. Chechurin, L.S. Chechurin (Russia)

Localization/Nonexistence Condition of Periodic Orbits of Polynomial Systems and Its Applications  
K.E. Starkov (Mexico)

Drift Bifurcation of Dissipative Solitons: Destabilization due to a Change of Shape  
S.V. Gurevich, H.U. Bödeker, A.S. Moskalenko, A.W. Liehr, H.-G. Purwins (Germany)

Frequency-Domain Conditions for Cycle-Slipping in Discrete Systems with Periodic Nonlinearity  
V.B. Smirnova, N.V. Utina, A.I. Shepeljavyi (Russia)

Phase Multistability of Self-Modulated Oscillations  
A.M. Nekrasov (Russia), O.V. Sosnovtseva (Russia/Denmark)

Oscillations of Natural Population’s Number Caused by External Control  
E.Ya. Frisman, E.V. Sycheva, E.V. Last (Russia)

2.7. Chaotic Dynamics

“Strange Nonchaotic Attractor” in 3D Autonomous Differential System  
M.V. Loginova, V.S. Anishchenko (Russia)

Applications of a New Ultimate Bound on the Trajectories of the Lorenz System to Synchronization and Estimation of the Hausdorff Dimension  
A. Pogromsky (The Netherlands), G. Santoboni (Italy), H. Nijmeijer (The Netherlands)

Numerical Estimates of Local and Global Motions of the Lorenz Attractor  
B.G. Kukharenko (Russia)

The Determined Chaos in Disturbed by Temperature Dynamic Systems with Gyros  
V.E. Dzhashitov, V.M. Pankratov (Russia)

Complex Dynamics of Double-Loop Tracking System  
V.P. Ponomarenko (Russia)

Stochastic Dynamics of FitzHugh-Nagumo Model near the Canard Explosion  
A. Shishkin, D. Postnov (Russia)

Baker Transformation as Autoregression System  
A.F. Goloubentsev, V.M. Ankin, S.A. Noyanova, Y.A. Barulina (Russia)

Impacting Oscillators — the Problem of Visualization of Basins of Attraction  
T. Kapitaniak, K. Czolczynski (Poland)

New Mechanism of Oscillations and Chaos in the Ecosystem with Intensive Exploitation  
E.Ya. Frisman, E.V. Sycheva (Russia)

Problems of Regular Behaviour and Deterministic Chaos in Mathematical Models of Mendelian Limited Populations  
E.Ya. Frisman, E.A. Kolbina, O.L. Zhidanova (Russia)
Global Bifurcations and Chaos in Polynomial Dynamical Systems ........................................... 670
V.A. Gaiko (Belarus)

Synchronization of Chaos and Small Signal Amplification in Electron-Hole Plasma of Germanium .................................................. 675
K.M. Aliev, I.K. Kamilov, Kh.O. Ibragimov, N.S. Abakarova (Russia)

Chaos in Germanium Oscillistor ................................................. 680
Kh.O. Ibragimov, K.M. Aliev, I.K. Kamilov, N.S. Abakarova (Russia)

2.8. Chaos and Rhythm: Production and Perception of Speech

Logistic Mapping as the Means of the Description of the Speech Rhythm in the Vicinity of the Critical Point ........................................ 683
O.P. Skljarov (Russia)

The Control of Dynamic Regimes of the Rhythm within Feigenbaum Scenario of Route to Chaos ................................. 689
O.P. Skljarov, T.N. Bortnik (Russia)

Robust Rhythm as a Consequence of the Universal Description of Complex System Dynamics in the Vicinity of Critical Point ......... 693
O.P. Skljarov, T.N. Skljarova (Russia)

Calculation of Logistics Equation Parameter on Experimental Data with the Miss ..................................................... 699
D.I. Yakushev (Russia)

An Internet System of Partner-Learning Special Type ......................................................... 703
A.N. Poroshin, O.P. Sktfarov (Russia)

Synergic Interaction of Components of Rarefied Comb Filtration of the Speech Signal ................................................ 707
S.M. Petrov, A.V. Borshchev (Russia)


3.1. Geometric and Optimal Control Methods for Quantum Dynamical Systems

Controllability of Open Quantum Systems: the Two Level Case ........................................... 710
C. Altafini (Italy)

Design of Laser Pulses for STIRAP Processes with Geometric Control Techniques ........................................... 715
U. Boscain (France), G. Chariot (Italy)

Controllability and Diameter of Single-Input Quantum Systems ........................................... 720
A. Agrachev (Italy), T. Chambrion (France)

Resonance in n-level Quantum Systems ........................................... 726
U. Boscain (France), G. Chariot (Italy)

The Dynamical Inverse Problem for a Nonlinear Schrodinger Equation Using Boundary Control ........................................... 732
M. Tomas-Rodriguez, S.P. Banks (UK)

Optimal Control of Coupled Spins in the Presence of Longitudinal and Transverse Relaxation ........................................... 736
D. Stefanatos, N. Khaneja (USA), S.J. Glaser (Germany)

3.2. Experimental Control of Molecular Systems

Open and Closed Loop Control of Complex Molecules with Shaped fs Pulses ........................................... 746
M. Motzkus (Germany)