



Proceedings of the
12th International Workshop on
Nonlinear Dynamics of Electronic Systems
NDES 2004

Centro de Geofísica de Évora,
Universidade de Évora,
Portugal, May 9-13, 2004

Edited by:

Jason A. C. Gallas
Mourad Bezzeghoud
Pedro G. Lind
João Corte Real

Published by
Centro de Geofísica de Évora
Universidade de Évora
Largo dos Colegais 2, 7000-803, Portugal

UB/TIB Hannover 89
119 837 986



Contents

I Invited Speakers	1
<i>Synchronization and pattern recognition in pulse-coupled neural networks,</i> HERMANN HAKEN	3
<i>Pattern formation of dunes,</i> HANS JURGEN HERRMANN	9
<i>Synchronization analysis of coupled noncoherent oscillators,</i> JURGEN KURTHS, Mamen Romano, Marco Thiel	17
<i>Network dynamics: tools and examples,</i> RUI VILELA MENDES	22
<i>Ideal turbulence,</i> ALEXANDER SHARKOSVSKY	34
<i>Economic fluctuations and statistical physics: the puzzle of large fluctuations,</i> HARRY EUGENE STANLEY, Xavier Gabaix, Parameswaran Gopikrishnan, and Vasiliki Plerou	42
II Contributed Papers	53
<i>Nonparametric embedding of dynamical systems,</i> M. Abel and K. Ahnert	55
<i>Nonlinear forecasting of earthquakes: a decade of results and future work,</i> E. Ivo Alves	59
<i>Innovation systems by nonlinear networks,</i> P. Andriani, F. Conti, L. Fortuna, M. Frasca, G. Passiante, and A. Rizzo	63
<i>Autocorrelation function and power spectrum of spiral chaos in dynamical systems,</i> V.S. Anishchenko, T.E. Vadivasova, G.I. Strelkova, and G.A. Okrokvetskikh	67
<i>A MOS circuit for the Lotka- Volterra chaotic oscillator,</i> Tetsuya Asai, Yusuke Kanazawa, Masayuki Ikebe, and Yoshihito Amemiya	71
<i>Chaotic third-order log-domain filter,</i> Alon Ascoli, Orla Feely, and Paul Curran	75
<i>A Generalized modulation law for generating constant- envelope spread-spectrum signals via frequency modulation,</i> Michele Balestra, Stefano Santi, Riccardo Rovatti and Gianluca Setti	79

<i>A new phenomenon: parametric chaos,</i> A.L. Baranovski and A.J. Lawrance	83
<i>Synchronization of chaotic colpitts oscillators with parameter mismatch,</i> Antanas Baziliauskas, Romanas Krivickas, and Arunas Tamasevicius	87
<i>Oscillations in the first-order recursive digital filters with magnitude truncation,</i> Yuriy Bryuhanov	91
<i>Clustering and nonlinear forecast for electronic devices market demand,</i> M. Bucolo, F. Caizzone, L. Fortuna, and G. Tomarchio	95
<i>Hardware prototype of the two-stage chaotic Colpitts oscillator for the UHF range,</i> S. Bumeliene, A. Tamasevicius, G. Mykolaitis, A. Baziliauskas, and E. Lindberg	99
<i>Comparison between Perturbation and Volterra methods,</i> Antonio Buonomo and A. Lo Schiavo	103
<i>Bifurcation analysis and chaotic behavior in boost converters: experimental results,</i> Donato Cafagna and Giuseppe Grassi	107
<i>Generation of chaotic beats in a modified Chua circuit - Part I: dynamic behaviour,</i> Donato Cafagna and Giuseppe Grassi	111
<i>Generation of chaotic beats in a modified Chua circuit - Part II: Circuit design,</i> Donato Cafagna and Giuseppe Grassi	115
<i>Electromagnetic synchronization of slip,</i> T. Chelidze, T. Matcharashvili, and O. Lursmanashvili	119
<i>Analysis of weight time series of patients with eating disorders,</i> F. Cuadros and M.I. Parra	122
<i>Homoclinic chaos in coupled Chua's oscillator,</i> S.K. Dana, S. Chakraborty, and G. Ananthakrishna	126
<i>Entropy-based independence test,</i> Andreia Dionisio, Rui Menezes, and Diana A. Mendes	130
<i>Synthesis of single-transistor chaotic oscillators,</i> Alexander S. Dmitriev, Elena V. Efremova, and Alexander D. Khilinsky	133
<i>Amplitude modulation and demodulation of chaotic carriers,</i> Alexander S. Dmitriev, Lev V. Kuzmin, and Anton M. Laktushkin	138
<i>Bifurcation associated with the Fitzhugh-Nagumo Systems,</i> Jorge Duarte, Luis Silva, and J. Sousa Ramos	142
<i>Application of State-Space Transformations to the Noise Analysis of Oscillators,</i> Thomas Falk and Wolfgang Schwarz	146
<i>Conductance: from electrical networks, through graphs, to dynamical systems,</i> Sara Fernandes and Jose Sousa Ramos	150

Effects of sequence-dependent elastic <i>properties in tandemly repeated DNA</i> , Alexandre F. da Fonseca, C.P. Malta, and M.A.M. de Aguiar	154
A chaotic circuit <i>with ferroelectric nonlinearity</i> , Luigi Fortuna, Mattia Frasca, Salvatore Graziani, and Salvatore Reddiconto	158
<i>Spatio-temporal dynamics towards self-synchronization index</i> , Luigi Fortuna, M. La Rosa, D. Nicolosi, and G. Sicurella	162
<i>Storing binary patterns in two-dimensional networks of nonlinear systems</i> , Zbigniew Galias and Maciej Ogorzalek	166
<i>The first eigenvalue of the Laplacian and the ground flow of a compact surface</i> , Clara Grácio and J. Sousa Ramos	170
<i>Circuit model of the atmospheric response function</i> , L. Hevesi, I.M. Janosi, A. Kiraly	174
<i>Emergent oscillations in a system of coupled nonlinear elements with broken symmetry</i> , V. In, A. Kho, A.R. Bulsara, J. Neff, B. Meadows, A. Palacios, P. Longhini, B. Ando, and S. Baglio	178
<i>Study of electronic master-slave MFHN neurons</i> , Sabir Jacquir, S.Binczak, J.M.Bilbault, V.B.Kasantsev, and V.I.Nekorkin	182
<i>Application of nonlinear dynamical systems to image encryption</i> , Kristina Kelber	186
<i>Nonlinear dynamics of cochlear information processing</i> , A. Kern and R. Stoop	190
<i>Synchronized firing of Fitzhugh-Nagumo neurons by noise</i> , H. Kitajima and T. Hattori	194
<i>A simple chaotic circuit with impulsive switch depending on time and state</i> , Yoshifumi Kobayashi, Hidehiro Nakano, and Toshimichi Saito	198
<i>Abelian Differential Equations Define Chaos Generator</i> , Tohru Kohda and Aya Katoh	202
<i>Numerical experiments with ground on AED theory: Investigation of Energetic Processes in Disordered Systems</i> , Aliaksei Konash, Paval Buka and Sergej Bagnich	206
<i>Rich synchronization of simple spiking oscillators</i> , Yoshio Kon'no, Toshimichi Saito, and Hiroyuki Torikai	210
<i>Cascaded return map models a nonperiodically clocked CPM boost converter</i> , Joerg Krupar and Wolfgang Schwarz	214
<i>Non-authorized access to the chaotic communication channel based on the partial approach to the inverse problem of non-linear dynamics</i> , V.N. Kuleshov and M.V. Tomashevskaya	219

<i>Two-stage impulsive control for the synchronization of chaotic systems,</i> K. Li, Y.C. Soh, and Z.G. Li	223
<i>On the Mechanisms behind Chaos,</i> Erik Lindberg	227
<i>General mechanism for suppression of homoclinic chaos,</i> Alexander Loskutov and Arsen Janoev	231
<i>On the existence of periodic solutions to the equation of a forced nonlinear oscillator,</i> Oleg Makarenkov	235
<i>Synchronizability of power-law and fractally coupled dynamical networks,</i> Mate Marodi	238
<i>Excitation-reshaping-induced chaotic escape from a potential well,</i> J.A. Martfnez and R. Chacon	242
<i>Coupled piecewise linear maps: from coherence to clustering,</i> Iryna Matskiv and Yuri Maistrenko	246
<i>Co-movements and threshold adjustment for the Portuguese and U.S. stock market volatility,</i> Rui Menezes and Nuno B. Ferreira	250
<i>Performances of unknown input observers for chaotic LPV maps in a stochastic context,</i> Gilles Millerieux and Jamal Daafouz	255
<i>Quantitative methods for the characterization of complex surface structures,</i> Alejandro Mora and Maria Haase	259
<i>Image processing with a cellular nonlinear network,</i> S. Morfu, P. Marqui, and J.M. Bilbault	263
<i>Schemes of Polynomial Equations that Characterize the Variational Behaviour,</i> F.L. Neerhoff and P. van der Kloet	267
<i>Identification of Bifurcation Parameters in Boost PFC Circuit,</i> Mohamed Orabi and Tamotsu Ninomiya	271
<i>On the start-up behavior of singularly perturbed harmonic oscillators,</i> Marcus Prochaska and Wolfgang Mathis	276
<i>Reconstruction of driven and coupled time-delay systems from time series,</i> M.D. Prokhorov, A.S. Karavaev, and V.I. Ponomarenko	280
<i>Conductance and noncommutative dynamical systems,</i> Carlos Correia Ramos, Nuno Martins, and Jose Sousa Ramos	284
<i>Antiphase to in-phase synchronization in coupled Chua's oscillators,</i> P.K. Roy and S.K. Dana	288

<i>Limit cycles in autonomous two-dimensional first order recursive digital filters with nonlinear adder without quantization,</i> D.V. Rudykh, M.V. Lebedev, and A.L. Priorov	292
<i>Complex Dynamics of a Two-cavity Klystron Oscillator with Delayed Feedback,</i> N.M. Ryskin and A.M. Shigaev	296
<i>D/A converters and iterated function systems,</i> Toshimichi Saito, Junya Shimakawa, and Hiroyuki Torikai	300
<i>The time-series modelling and circuit implementation from time-frequency domain specifications,</i> F. Acar Savaci and Nalan Ozkurt	304
<i>Collapse and Coexistence of Duck Solution in a Circuit Driven by an Extremely Small Periodic Force,</i> Munehisa Sekikawa, Naohiko Inaba, Tetsuya Yoshinaga, and Hiroshi Kawakami	308
<i>Topological invariants in a model of a time-delayed Chua's circuit,</i> R. Severino, A. Sharkovsky, J. Sousa Ramos and S. Vinagre	312
<i>Fractal analysis of X-ray chest images,</i> Maciej H. Slomczynski and Bozena Swidzinska	316
<i>Sympatric specification in an age-structured population living on a lattice,</i> Adriano O. Sousa	320
<i>Complexity measures for nonlinear electronic systems: Comment on the Shiner-Davison-Landsberg measure,</i> R. Stoop, N. Stoop, A. Kern, and W. H. Steeb	324
<i>VHF and UHF chaotic Colpitts oscillators,</i> A. Tamasevicius, G. Mykolaitis, S. Bumeliene, R. Krivickas, and E. Lindberg	328
<i>Variability of interburst intervals in 2D slow-fast maps for neural responses,</i> Gouhei Tanaka and Kazuyuki Aihara	332
<i>Controlling the chaotic colpitts oscillator by altering its oscillation energy,</i> V. Tereshko, R. Chacdn, and J. Carballar	336
<i>Spurious structures in recurrence plots induced by embedding,</i> M. Thiel, M.C. Romano, and J. Kurths	340
<i>Fractal properties of chaotic dynamical systems in reverse time and its application for data encryption,</i> A.I. Tomashevskiy and M.V. Kapranov	344
<i>Bifurcation in current coupled BVP oscillators,</i> Shigeki Tsuji, Tetsushi Ueta, and Hiroshi Kawakami	348
<i>An Aspect of Oscillatory Conditions in Linear Systems and Hopf Bifurcations in Nonlinear Systems,</i> Tetsushi Ueta and H. Kawakami	352

<i>Floquet Numbers and Dynamic Eigenvalues,</i> P. van der Kloet and F.L. Neerhoff	356
<i>Synchronization in models of discrete phase oscillators,</i> Anna Vasylenko, Yu. Maistrenko, M. Hasler	360
<i>Application of fractal analysis in detection of bone structure changes,</i> Michal Wroblewski and Bozena Swidzinska	364
<i>An Extended Bernoulli Map Driven by Dynamic Thresholding,</i> Kenji Yano and Kiyoshi Tanaka	368
<i>Optimal multi-user chaos-shift-keying communication systems,</i> Ji Yao	372
<i>Heart Tissue as a Dynamical System,</i> E. Zhuchkova and A. Loskutov	376
<i>A Model for The 'Chaotic' Oscillations of Congenital Nystagmus</i> Christopher M. Harris and David L. Berry	380
Index by authors	385