

# Contents

## Invited Speakers

<b>Construction of a Chaotic Computer Chip</b> .....	3
William L. Ditto, K. Murali and Sudeshna Sinha	
<b>Activated Switching in a Parametrically Driven Micromechanical Torsional Oscillator</b> .....	15
H.B. Chan and C. Stambaugh	
<b>Quantum Nanomechanics</b> .....	25
Pritiraj Mohanty	
<b>Coupled-Core Fluxgate Magnetometer</b> .....	37
Andy Kho, Visarath In, Adi Bulsara, Patrick Longhini, Antonio Palacios, Salvatore Baglio and Bruno Ando	
<b>Data Assimilation in the Detection of Vortices</b> .....	47
Andrea Barreiro, Shanshan Liu, N. Sri Namachchivaya, Peter W. Sauer and Richard B. Sowers	
<b>The Role of Receptor Occupancy Noise in Eukaryotic Chemotaxis</b> .....	61
Wouter-Jan Rappel and Herbert Levine	
<b>Applications of Forbidden Interval Theorems in Stochastic Resonance</b> ...	71
Bart Kosko, Ian Lee, Sanya Mitaim, Ashok Patel and Mark M. Wilde	
<b>Smart Materials and Nonlinear Dynamics for Innovative Transducers</b> ...	91
B. Andò, A. Ascia, S. Baglio, N. Pitrone, N. Savalli, C. Trigona, A.R. Bulsara and V. In	
<b>Dynamics in Non-Uniform Coupled SQUIDs</b> .....	111
Patrick Longhini, Anna Leese de Escobar, Fernando Escobar, Visarath In, Adi Bulsara and Joseph Neff	

<b>Applications of Nonlinear and Reconfigurable Electronic Circuits . . . . .</b>	119
Joseph Neff, Visarath In, Christopher Obra and Antonio Palacios	
<b>Multi-Phase Synchronization and Parallel Power Converters . . . . .</b>	133
Toshimichi Saito, Yuki Ishikawa and Yasuhide Ishige	
<b>Coupled Nonlinear Oscillator Array (CNOA) Technology – Theory and Design . . . . .</b>	145
Ted Heath, Robert R. Kerr and Glenn D. Hopkins	
<b>Nonlinear Dynamic Effects of Adaptive Filters in Narrowband Interference-Dominated Environments . . . . .</b>	163
A.A. (Louis) Beex and Takeshi Ikuma	
<b>Design-Oriented Bifurcation Analysis of Power Electronics Systems . . . . .</b>	175
Chi K. Tse	
<b>Collective Phenomena in Complex Social Networks . . . . .</b>	189
Federico Vazquez, Juan Carlos González-Avella, Víctor M. Eguíluz and Maxi San Miguel	
<b>Enhancement of Signal Response in Complex Networks Induced by Topology and Noise . . . . .</b>	201
Juan A. Acebrón, Sergi Lozano and Alex Arenas	
<b>Critical Infrastructures, Scale-Free Networks, and the Hierarchical Cascade of Generalized Epidemics . . . . .</b>	211
Markus Loecher and Jim Kadtk	
<b>Noisy Nonlinear Detectors . . . . .</b>	225
A. Dari and L. Gammaitoni	
<b>Cochlear Implant Coding with Stochastic Beamforming and Suprathreshold Stochastic Resonance . . . . .</b>	237
Nigel G. Stocks, Boris Shulgin, Stephen D. Holmes, Alexander Nikitin and Robert P. Morse	
<b>Applying Stochastic Signal Quantization Theory to the Robust Digitization of Noisy Analog Signals . . . . .</b>	249
Mark D. McDonnell	
<b>Resonance Curves of Multidimensional Chaotic Systems . . . . .</b>	263
Glenn Foster, Alfred W. Hübler and Karin Dahmen	
<b>Learning of Digital Spiking Neuron and its Application Potentials . . . . .</b>	273
Hiroyuki Torikai	
<b>Dynamics in Manipulation and Actuation of Nano-Particles . . . . .</b>	287
Takashi Hikihara	

<b>Nonlinear Buckling Instabilities of Free-Standing Mesoscopic Beams . . . . .</b>	297
S.M. Carr, W.E. Lawrence and M.N. Wybourne	
<b>Developments in Parrondo's Paradox . . . . .</b>	307
Derek Abbott	
<b>Magnetophysiology of Brain Slices Using an HTS SQUID Magnetometer System . . . . .</b>	323
Per Magnelind, Dag Winkler, Eric Hanse and Edward Tarte	
<b>Dynamical Hysteresis Neural Networks for Graph Coloring Problem . . . . .</b>	331
Kenya Jin'no	
<b>Semiconductor Laser Dynamics for Novel Applications . . . . .</b>	341
Jia-Ming Liu	
<b>Nonlinear Prediction Intervals by the Bootstrap Resampling . . . . .</b>	355
Tohru Ikeguchi	
<b>Quantum Measurements with Dynamically Bistable Systems . . . . .</b>	367
M.I. Dykman	
 <b>Poster Session</b>	
<b>Dynamics and Noise in dc-SQUID Magnetometer Arrays . . . . .</b>	381
John L. Aven, Antonio Palacios, Patrick Longhini, Visarath In and Adi Bulsara	
<b>Stochastically Forced Nonlinear Oscillations: Sensitivity, Bifurcations and Control . . . . .</b>	387
Irina Bashkirtseva	
<b>Simultaneous, Multi-Frequency, Multi-Beam Antennas Employing Synchronous Oscillator Arrays . . . . .</b>	395
J. Cothern, T. Heath, G. Hopkins, R. Kerr, D. Lie, J. Lopez and B. Meadows	
<b>Effects of Nonhomogeneities in Coupled, Overdamped, Bistable Systems . . . . .</b>	403
M. Hernandez, V. In, P. Longhini, A. Palacios, A. Bulsara and A. Kho	
<b>A New Diversification Method to Solve Vehicle Routing Problems Using Chaotic Dynamics . . . . .</b>	409
Takashi Hoshino, Takayuki Kimura and Tohru Ikeguchi	
<b>Self-Organized Neural Network Structure Depending on the STDP Learning Rules . . . . .</b>	413
Hideyuki Kato, Takayuki Kimura and Tohru Ikeguchi	

<b>Communication in the Computer Networks with Chaotic Neurodynamics .....</b>	417
Takayuki Kimura and Tohru Ikeguchi	
<b>Nonlinear DDE Analysis of Repetitive Hand Movements in Parkinson's Disease .....</b>	421
Claudia Lainscsek, Luis Schettino, Peter Rowat, Elke van Erp, David Song and Howard Poizner	
<b>Experimental Results of Coupled E-Field Sensor .....</b>	427
Norman Liu	
<b>Chaos Generators for Noise Radar .....</b>	433
K.A. Lukin, V. Kulyk and O.V. Zemlyaniy	
<b>Resonance Induced by Repulsive Links .....</b>	439
Teresa Vaz Martins and Raúl Toral	
<b>Time Scales of Performance Levels During Training of Complex Motor Tasks .....</b>	445
Gottfried Mayer-Kress, Yeou-Teh Liu and Karl M. Newell	
<b>Analysis of Nonlinear Bistable Circuits .....</b>	449
Suketu Naik	
<b>Noise-Induced Transitions for Limit Cycles of Nonlinear Systems .....</b>	455
Lev Ryashko	
<b>Torus Bifurcation in Uni-Directional Coupled Gyroscopes .....</b>	463
Huy Vu, Antonio Palacios, Visarath In, Adi Bulsara, Joseph Neff and Andy Kho	
<b>Index .....</b>	469