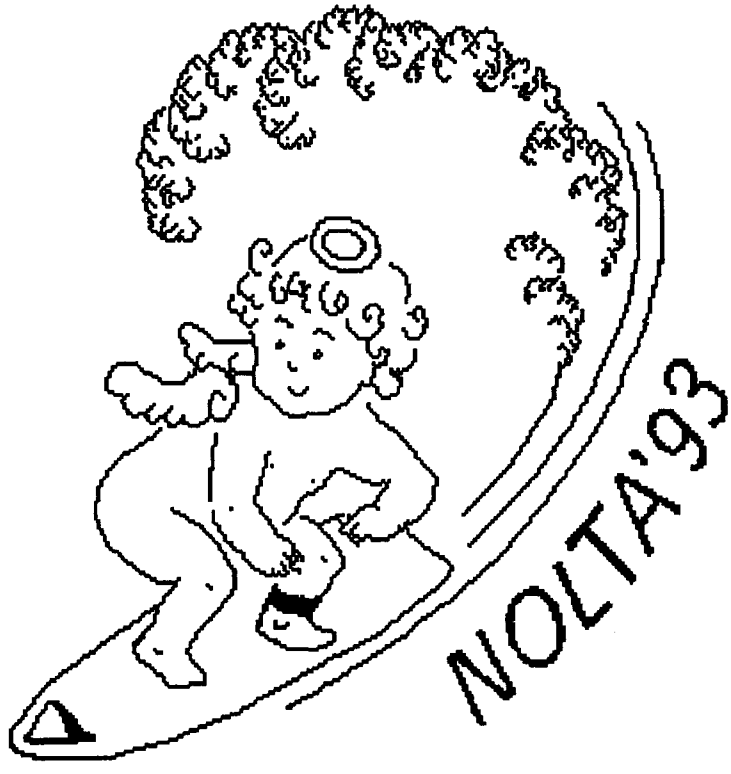
1993 International Symposium on
Nonlinear Theory and its Applications

Sheraton Waikiki Hotel, HAWAII
December 5 - 10, 1993

# PROCEEDINGS

## VOL. 3(Wednesday)




**Organizers:**
Research Society of Nonlinear Theory and its Applications, IEICE
Dept. of Elect. Engr., Univ. of Hawaii

**Sponsor:**
Research Society of Nonlinear Theory and its Applications, IEICE

**Cosponsors:**
The Telecommunications Advancement Foundation (TAF)
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**In cooperation with:**
IEEE Hawaii Section
IEEE Circuits and Systems Society
IEEE Neural Networks Council
International Neural Network Society
IEEE CAS Technical Committee on Nonlinear Circuits and Systems
Technical Group of Nonlinear Problems, IEICE
Technical Group of Circuits and Systems, IEICE

- K. Nakajima, T. Onomi, T. Yamashita, Y. Sawada
  Resesarch Institute of Electrical Communcation,
  Tohoku University, JAPAN

## 6.2 Workshop (R.Madan) - Room D

- Chua's Circuit : Chaotic Phenomena and Applications

1. *Trajectory Recognition in an Array of Chaotic Systems Using Chua's Circuits*
   - E. J. Altman
     ATR Communication Systems Research Lab., JAPAN
2. *Real-time Horseshoe Visualization in Chua's Circuit*
   - Fan Zou, J. Pletl and A. Nossek
     Technical University of Munich, GERMANY
3. *Application of Chua's Circuit to Sound and Music, Musical Instruments*
   - X. Rodet
     University of Paris, FRANCE
4. *Chua's Circuit : Ten Years Later Part 2 : Live Demonstration and Video Presentation*
   - *Including Strange Attractors, Secure Communication, Controlling Chaos, Musical Sound Synthesis, Exploiting Chaos for Musical Composition*
   - L. O. Chua and C. W. Wu
     University of California Berkeley
   - V. Perez-Munuzuri
     University of Satiago
   - I. Choi, R. Bargar, G. Mayerkress
     University of Illinois

# 7 Wednesday Early Morning

8:00AM~10:15AM

## 7.1 Neural Network Theory and Applications (I ) (T.D.Gedeon) - Room A

1. *Multiple Competitive Learning Networks for Phoneme Recognition*
   - Jesung Ahn, Jongwan Kim, Heungho Lee and Yanghee Choi
     Seoul National University, KOREA
2. *New Heuristic Distributed Parallel Search Algorithms and Neural Network Implementations*
   - Dianxun Shuai and Yoichiro Watanabe
     Doshisha University, JAPAN
3. *Prediction of 5'-Splice Site Sequences by a Neural Network*
   - Khawaja Sirajuddin, Tomomasa Nagashima and K. Ono
     Muroran Institute of Technology, JAPAN
4. *Using Bidrectional Associative Memories to Coding Time - Sequential Imagery*
   - Slawomir Skoneczny, Jaroslaw Szostakowski and Rafal Foltyniewicz
     Warsaw University of Technology, POLAND
5. *Index Generation is Better than Extraction*
   - T. D. Gedeon and A. H. H. Ngu
     The University of New South Wales, AUSTRALIA
6. *Neural Network Muon Track Fitter for the Dumand II Array*
   - John Fryckman
     University of Hawaii at Monoa, U. S. A.

## 7.2 Deterministic Modeling and Prediction (J.Eriksson) - Room B

1. *Prediction of Chaos Using Stabilization Principle*

- Michail Zak and Alexander Zak
  California Institute of Technology, U. S. A.

2. *A Conjectured Continuous Approach to Chaotic Modeling*

   - M. E. cOHEN, D. L. Hudson and M. F. Anderson
     University of California, California State University, VA Medical Center, U. S. A.

3. *An Application of Deterministic Nonlinear Prediction to Water Demand Data*

   - T. Iokibe, T. Kimura and K. Aihara
     Meidensha Corporation, University of Tokyo, JAPAN

4. *Is it Useful to Compare Seasonally Adjusted Economic Data with Unadjusted Ones ?*

   - Toshio Inaba, Yoshinori Nagai and Hiroshi Wako
     Waseda University, Kokushikan Universty, JAPAN

5. *Methods for Detecting the Dynamical Equations from a Time Series*

   - Juha Perttula, Timo Tarhassari and Jarl-Thure Eriksson
     Tampere University of Technology, FINLAND

6. *Order Versus Disorder - Philosophical Implications on Computability and Modelling of Complex Systems*

   - Jarl-Thure Erikkson, Juha Perttula and Timo Tarhassari
     Tampere University of Technology, FINLAND

## 7.3 Chaos Circuit (II ) (R.Lozi) - Room C

1. *On the Effects of the Capacitor in the Time Delayed Chua's Circuit*

   - M. Biey, F. Bonani, M. Gilli and I. Maio
     Politecnico di Torino, ITALY

2. *Asynchronous Simultaneous Oscillations in Negative Resistance Oscillatory Circuit Containing Periodically Operating Analog Switch*

   - Michitaka Matsuki and Shinsaku Mori
     Kinki University, Keio University, JAPAN

3. *Basic Sets Separating Two Coexisting Oscillations in a Delayed System*

   - Tadashi Mitsui, Yoshisuke Ueda and J. M. T. Thompson
     Kyoto University, University College London, JAPAN

4. *Stabilizing Chaotic Motions in Chua's Circuit*

   - Keiji Konishi, Yoshiaki Shirao, Hiroaki Kawabata, Yoshio Inagaki and Youji Takeda
     Nara National College of Technology, University of Osaka Prefecture JAPAN

5. *Route to Hyperchaos in an Odd Dimensional Hysteresis Circuit*

   - Kunihiko Mitsubori and Toshimichi Saito
     Hosei University, JAPAN

## 7.4 Special Session (M.Hasler) - Room D

- Nonlinear Circuits

1. *Melnikov Method Applied to Piecewise-Linear High-Damping Phase-Locked Loops with $\beta \neq 2\zeta$ Case*

   - Tetsuro Endo
     Meiji University, JAPAN

2. *Between n-Double Sinks and n-Double Scrolls ($n = 1, 2, 3, 4, \cdots$)*

   - Johan Suykens, Joos Vandewalle
     Katholieke Universiteit of Leuven, BELGIUM

3. *Mutual Synchronisation Between Different Chaotic Systems*

   - Ljupco Kocarev
     Sts. Cyril and Methodius University, Macedonia
   - Maciej Ogorzalek
     University of Mining & Metallurgy, POLAND

4. *Parameter Tolerances in Nonlinear Resistive Circuits. Worst Case Analysis Based on Monotonicity*
   - Martin Hasler, C. Wang
     Swiss Federal Institute of Technology, SWITZERLAND
5. *Tracing Any Family of Characteristics of a Two-Port Composed of PWL Resistive Elements*
   - Stefano Pastore, Amedeo Premoli
     University of Trieste, ITALY
6. *Application of Normal Forms to the Analysis of Nonlinear Circuits*
   - C. Keidies, W. Mathis
     University Wuppertal, GERMANY

## 7.5 Nonlinear Channel (I.Sasase) - Room E

1. *A Preliminary Study on SHD Image Cipher*
   - Hiroshi Nagase, Naoki Takeda and Masaru Kakuma
     Kanazawa Institute of Technology, JAPAN
2. *Acoustic Emission Sequences Measured in Ogachi HDR Geothermal Field*
   - Koji Nagano, Masato Aida, Kazuhiko Sato, Hiroaki Niitsuma and Hideshi Kaieda
     Muroran Institute of Technology, Tohoku University, Central Resarch Institute of Electric Power Industry, JAPAN
3. *A New Approach to Estimating Spectral Moments of the Output of a Memoryless Nonlinearity*
   - G. J. McCaughan and K. V. Lever
     Trinity College, UK, University of South Australia, AUSTRALIA
4. *A Method of Designing Biorthogonal Wavelets and its Application to the Optimal Choice of an Analyzing Wavelet for Signal Representation*
   - Akio Miyazaki and Kei-ichi Miyazaki
     Kyushu University, JAPAN
5. *Configuration of the Receiver for Nonlinearly Amplified Spread Spectrum Signals in CDMA Systems*
   - Manabu Sawada, Massaki Katayama, Takaya Yamazato and Akira Ogawa
     Nagoya University, JAPAN
6. *Performance Evaluation of Constrained Transition Vector Quantization on Rayleigh Fading Channels*
   - Masanori Hanawa and Takaaki Hasegawa
     Saitama University, JAPAN
7. *Coherent Subcarrier Multiplexed System using an Orthogonal Polarization State as a Pilot Signal in the Presence of Second- and Third-order Intermodulation Distortions*
   - Tomoaki Ohtsuki, Iwao Sasase and Shinsaku Mori
     Keio University, JAPAN

## 7.6 Nonlinear Circuit Analysis (A.Willson) - Room F

1. *A Method for Designing Circuits Containing Several Kinds of Nonlinear Elements*
   - Atsushi Kawakami
     Kanazawa Institute of Technology, JAPAN
2. *Calculation Method of Generalized Describing Functions Based on Volterra Series*
   - Satoshi Ichikawa and Yasuhiro Kamoo
     Kyoto University, JAPAN
3. *Josephson Combinational Logic Cellular Arrays*
   - Fu-Qiang Li, Mititada Morisue and Shoji Watanabe
     Saitama University, Teikyo University of Technology, JAPAN
4. *On the Stability of Circuits Containing Nonlinear Operational Amplifiers*
   - Yaw-Ruey Chan and Michael M. Green
     State University of New York, U. S. A.

5. *Singular Conditions for Reducing Order of Linear Time-Invariant Systems*
   - Fumihiro F. Shoji
     Fukuoka Institute of Technology, JAPAN

## 7.7 Special Session (Cancel)

## 7.8 Special Session (M.Matsumoto) - Room H

- Optical Soliton and its Applications

1. *High Speed Optical Soliton Communication Using Erbium-Doped Fiber Amplifiers and Soliton Transmission Control*
   - Hirokazu Kubota, Masataka Nakazawa
     NTT, JAPAN
2. *Analyses on Soliton Based Communication Systems*
   - Yuji Kodama
     Ohio State University, U.S.A.
3. *Solitons in Optical Fibers with Randomly Varying Birefringence*
   - C.R.Menyuk, P.K.A.Wai
     University of Meryland, U.S.A.
4. *Separation of Signal from Noise in Soliton-Based Communication Systems*
   - A. Hasegawa, T. Yano
     Osaka University, Japan
   - Y. Kodama
     Ohio State University
5. *Fiber Nonlinear Effects in Long-Distance Optical Transmission Systems with Optical Amplifiers*
   - Makoto Murakami
     NTT Transmission Systems Laboratories, JAPAN
6. *On Uncertainty Principle for Scattering Transform*
   - Natalia I. Grinberg
     Moscow State University, RUSSIA
7. *Suppresion of Linear-Wave Growth in Bandwidth-Limited Soliton Transmisson by Means of Nonlinear Gain*
   - Masayuki Matsumoto, Hiroki Ikeda, Akira Hasegawa
     Osaka University, Japan

# 8 Wednesday Late Morning

10:45AM~1:00PM

## 8.1 Neural Network Theory and Applications (II ) (N.Farhat) - Room A

1. *A Nonlinear Neural Network Combined with Symbolic Processing*
   - D.L.Hudson and M.E.Cohen
     Univ. of California, California State Univ., U.S.A.
2. *Neural Network Based Classifiers as Useful Tools in Zip Code Recognition Task*
   - Slawomir Skoneczny, Rafal Foltyniewicz and Jaroslaw Szostakowski
     Warsaw University of Technology, POLAND
3. *A General Display for the Visualization of Artificial Neurons*
   - T. D. Gedeon and J. Lin
     The University of New South Wales, AUSTRALIA
4. *Network Analysis Techniques as Visualisation Tools*
   - Rod Good and T. D. Gedeon
     The University of New South Wales, AUSTRALIA
5. *The Role of Neural Networks in Knowledge Based Systems*
   - Erich Schikuta
     The University of Vienna, AUSTRIA

6. *Rejection Driven Hierarchy of Neural Network Classifiers*

   - S. Knerr and A. Sperduti
     ESCPI and Centre Natl. De La Recherche Scientifigue, FRANCE, Univ. of Pisa, ITALY

## 8.2 Discrete Chaos (A.N.Sharkovsky) - Room B

1. *Forecasting values in a chaotic time series*

   - Giovanna Morgavi and Claudio Martini
     National Research Council, ITALY

2. *A Continuous Stationary Analysis with $KM_2O$-Langevin Equations*

   - Sanae Kimoto, Tohru Ikeguchi, Takeshi Matozaki and Kazuyuki Aihara
     Science University of Tokyo, University of Tokyo, JAPAN

3. *An Evaluation of Statistical Properties of Pseudo-Random Numbers Generated by One-Dimensional Maps*

   - Yasutada Oohama and Tohru Kohda
     Kyushu University, JAPAN

4. *An Explicit Evaluation of Correlation Functions of Chebyshev Binary Sequences Based on Perron-Frobenius Operator*

   - Tohru Kohda and Akio Tsuneda
     Kyushu University, JAPAN

## 8.3 Optimization Alglorithm (A.Ushida) - Room C

1. *New Legendre Type Conditions for Optimal Control Problems, Linear in the Control*

   - A. V. Dmitruk and A. A. Milyutin
     Russian Academy of Sciences (CEMI RAN), RUSSIA

2. *A Suboptimal Feedback Control Law Used a Function Uniting Piecewise Linear Controllers and its Application to Power System*

   - Hitoshi Takata, Kazuo Komatsu, Shigeru Oniki and Takuro Mochizuki
     Kyusyu Inst. of Tech., Kumamoto Natl. College of Tech., Kyusyu Electric Power Co. Inc., JAPAN

3. *Minimization of Integral of Squared Error with a Descent Newton Type Method*

   - Terho T. Jussila and Heikki N. Koivo
     Tampere University of Technology, FINLAND

4. *An Algorithm for Evaluation of ITSE and ISTSE*

   - Terho T. Jussila and H. N. Koivo
     Tampere University of Technology, FINLAND

5. *Optimum Coordination of Nonlinear Dynamic Systems with Its Application to Robot Locomotion*

   - Zhi-wei Luo, Koji Ito, Masami Ito and Hideo Yuasa
     Toyohashi Univ. of Tech., Nagoya Univ., JAPAN

6. *Parameter Learning And Its Applications in Nonlinear Optimization*

   - B. John Oommen
     Carleton University, CANADA

## 8.4 Duffing Dynamics (P.Glendinning) - Room D

1. *Classification of Solutions on Some Nonlinear Differential Equation*

   - Yoichi Manome, Masamitu Otake, Taketoshi Mishima, Kaoru Katori and Mititada Morisue
     YHP, Meiji Univ., Saitama Univ., Hirosaki Univ., JAPAN

2. *On Computing Connecting Orbits in the Sine-Gordon and Hodgkin-Huxley Equations*

   - Mark J. Friedman and Eusebius J. Doedel
     Univ. of Alabama in Huntsville, U.S.A., Concordia Univ. CANADA

3. *Hereditary Model of Nonlinear Elacstic Spring*

   - Anatoli Stulov
     Estonian Academy of Sciences Institute of Cybernetics, ESTONIA

4. *Self-generated Chaos in a Spatially Extended System with Two Types of Instabilities*

- Hidetaka Ito, Keigo Harada and Yoshisuke Ueda
  Kyoto University, JAPAN

5. *Harmonic Synchronization and Unstable Chaos in Duffing-Rayleigh Oscillator with Hard Characteristics*

   - H. Fujiwara and H. Kawakami
     Tokushima University, JAPAN

6. *Numerical Verification of Existence and Inclusion of Periodic Solutions for the Duffing Equations*

   - Shin'ichi Oishi
     Waseda University, JAPAN

## 8.5 Special Session (L.Giles) - Room E

- Neural Dynamics and Applications

1. *Learning Temporal Signals in Phase Space*

   – Fu-Sheng Tsung, Garrison W. Cottrell
     Univ. of California, San Diego, U.S.A.

2. *Discrete Recurrent Neural Networks as Pushdown Automata*

   – Z. Zeng, R. M. Goodman and P. Smyth
     California Institute of Technology, U.S.A.

3. *Financial Time Series Forecasting:Application of Artical Neural Network Techniques*

   – A. C. Tsoi, S. Lawrence
     University of Queensland, AUSTRALIA
   – C. N. W. Tan
     Bond University

## 8.6 Circuit Simulation (I.Shirakawa) - Room F

1. *An Algorithm for representing Functions of Several Variables by Superpositions of Function of One Variable and Addition*

   - Kiyotaka Yamamura
     Gunma University, JAPAN

2. *An Effective Method to Find All Solutions of Piecewise-linear Circuits using Partitioning*

   - Hikaru Mizutani
     Shonan Institute of Technology, JAPAN

3. *A Priori Estimation for Computational Complexity of Homotopy Method for Calculating Solutions of Strongly Monotone Equations*

   - Mitsunori Makino, Masahide Kashiwagi and Shin'ichi Oishi
     Chuo University, Waseda University, JAPAN

4. *Transient Simulation of Nonlinear Circuits in the Neighborhood of an Unstable Operating Point*

   - Michael M. Green and A. N. Willson, Jr
     State Univ. of New York, Univ. of California L.A., U.S.A.

## 8.7 Power Engineering (I ) (L.Chen) - Room G

1. *The Creation Algorithm of the Rigid Matrix of the Nonlinear Anisotropy Space*

   - Vasyl Tchaban and Orest Dmytryshyn
     Lviv Polytechnical Institute, UKRAINE

2. *Power System Economic Load Dispatching with a Two-Phase Genetic Algorithm*

   - Hiroyuki Mori and Takuya Horiguchi
     Meiji University, JAPAN

3. *Power System Topological Observability Index and it's Maximization with a Genetic Algorithm*

   - Hiroyuki Mori
     Meiji University, JAPAN

4. *Analysis of Solid-Steel Magnetic Circuits of A. C. Electrical Machines: Nonlinearity, MMF, and Leakage Reactances*

   - J. F. Gieras
     University of Cape Town, South Africa

## 8.8 Fluid Mechanics (T.Kohda) - Room H

1. *An Estimate and Blow up behavior of Solutions for a Time-Dependent Partial Differential Equation*

   - Cao Zhen Chao
     Xiamen University, P. R. CHINA

2. *Non-linear oscillations of figures of equilibrium*

   - A. S. Baranov
     Institute for Theoretical Astronomy, RUSSIA

3. *A Ray method for Solving Boundary-Value Problems Connected with the Propagation of Finite Amplitude Shock Waves*

   - A. A. Burenin, Yu. A. Rossikhin and M. V. Shitikova
     Voronezh State Academy, RUSSIA

4. *Mathematical Modeling of Nonstability Modes of Combustion in a Stream*

   - P.M.Krishenik, A.I.Mamedov, S.I.Khydayev, G.B.Manelis and G.V.Shkadinskaya
     Russian Academy of Sciences, RUSSIA

5. *Propagation of Nonlinear Acoustic Pulses Excited by the Detonation Generator*

   - V. E. Fridman, A. L. Fogel, I. P. Chunchuzov and L. Yu. Sobolev
     Radiophisical Research Institute, RUSSIA

6. *Stratified Gas and Nonlinear Waves Passing the Knudsen Layer*

   - D. A. Vereshchagin and S. B. Leble
     Kaliningrad State University, RUSSIA

7. *Fluid Dynamics in the Oral Cavity of Suspension Feeding Fishes*

   - A. Y. Cheer, Y. Ogami and S. L. Sanderson
     University of California, U. S. A.

8. *An Artificial Neural Network Simulation of Two-Dimensional Laminar Boundary Layer Flow*

   - Andrew J. Meade, Jr.
     Rice University, U. S. A.

9. *Nonlinear Waves in Chemically Reacting Mixtures*

   - Timothy Margulies
     U. S. A.

# 9 Wednesday Afternoon

13:15PM~14:45PM

## 9.1 Plenary Lectures

1. *Chaotic Neurodynamics in Biological Intelligence*

   - W. J. Freeman

2. *Some Aspects in the Study of Nonlinear Dynamics*

   - T. Koga

# 10 Thursday Early Morning

8:00AM~10:15AM

## 10.1 Neural Modeling (R.Takiyama) - Room A

1. *A Learning Model Based on Cortical Modulation and LTP*

   - Brendan Kitts
     University of Technology Sydney, AUSTRALIA

2. *Stochastic Resonance in a Neural Network Model of the Phenomenon of Perceptual Alternation*

   - Massimo Riani and Enrico Simonotto
     University of Genoa, ITALY

3. *A Differential-Geometrical Theory of Binocular Visual Space*

   - Ryuzo Takiyama
     Kyushu University of Design, JAPAN