Proceedings of
the 2017 International Symposium on
Nonlinear Theory and its Applications (NOLTA2017)

Cancun International Convention Center,
Cancún, Mexico
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2017 International Symposium on Nonlinear Theory and its Applications

Cancun International Convention Center,
Cancún, Mexico
December 4–7, 2017

Organizer:
NOLTA Society, IEICE

In Cooperation with:
Technical Group on Nonlinear Problems, IEICE
Technical Group on Complex Communication Sciences, IEICE
Technical Group on Circuits and Systems, IEICE
Welcome Message from the General Chairs

Bienvenidos a Cancún, Mexico,

Mekishiko no Kankun e yōkoso,

Welcome to Cancun, Mexico

Dear Participants of NOLTA 2017,

On behalf of my co-Chair, Prof. Hisato Fujisaka from Hiroshima University, and the organizing committee, we sincerely welcome all of you to Cancún, Mexico and to the 2017 International Symposium on Nonlinear Theory and Its Applications (NOLTA2017). This is the 27th NOLTA Symposium organized by the NOLTA Society, IEICE. Since the 1st NOLTA in 1991, NOLTA has been held not only in Japan, but also in various places: Canada, China, Germany, Hungary, Italy, Poland, Spain, Switzerland, and USA. It is now our great honor to organize the NOLTA2017 in Cancún, Mexico.

The island of Cancún was originally known to its Maya inhabitants as Nizuc (Yucatec Maya [ni su uk]) meaning either “promontory” or “point of grass”. In the years after the Conquest, much of the Maya population died off or left as a result of disease, warfare, piracy, and famines, leaving only small settlements on Isla Mujeres and Cozumel Island.

The name Cancun, Cancum or Cankun first appears on 18th-century maps. The meaning of Cancún is unknown, and it is also unknown whether the name is of Maya origin. If it is of Maya origin, possible translations include “Place/Seat/Throne of the Snake” or “Enchanted Snake”. Snake iconography was prevalent at the pre-Columbian site of Nizuc.

The aim of NOLTA2017 is to offer a forum for a multi-disciplinary meeting bringing together leading physicists, chemists, and engineers in the field of Nonlinear Science and its Applications. The meeting is expected to gauge the forefront of technological developments in the field and to foster new cooperative links between leading research groups throughout the world, in Asia, Europe, Canada, the U.S., Mexico and South America. As a reflection of the interdisciplinary nature of NOLTA2017, the technical program includes a comprehensive multi-disciplinary technical program with a large number of special session papers (across a wide span of applications), regular session papers and a presentation for the best student awards.

On behalf of my co-Chair, Hisato Fujisaka, I would like to thank the Technical Program Chairs, Prof. Kiyohisa Natsume (Kyushu Institute of Technology) and Dr. Visarath In (Space and Naval Warfare Center, San Diego), who have out together a technical program of the highest quality spanning three days of lecture sessions that cover all subjects of interest in the field of nonlinear science and engineering.

Also, we would like to thank the efforts of our Special Session Chairs, Prof. Luciano Buono (University of Ontario Institute of Technology) and Prof. Hiroyuki Torikai (Kyoto Sangyo University).

We acknowledge the rest of the committee: Finance Chair and Secretary, Prof. Hidehiro Nakano and Prof. Nobuyoshi Komuro; Publication co-Chairs, Secretary and Publicity Chair, Prof. Maria Leite, Tadashi Tsubone, Wataru Kurebayashi, and Takashi Matsubara; and the General co-Secretaries: Prof. Hugo Gonzalez, Prof. Masahiro Wada, and Prof. Takeshi Kamio.

Thank you all for your participation in NOLTA2017. Enjoy the meeting and Cancún.

Antonio Palacios
San Diego State University
General co-Chair, NOLTA 2017

Hisato Fujisaka
Hiroshima City University
General co-Chair, NOLTA 2017
Technical Program Chair’s Message

On behalf of the Technical Program Committee (TPC), welcome to 2017 International Symposium on Nonlinear Theory and Its Applications (NOLTA2017) at Cancún, where is one of the most famous resort in Mexico!

A total of 206 papers have been received from 13 countries and 198 papers are included for presentations in the technical program. We have 41 oral sessions including 29 special sessions. Additionally, it is my pleasure to have three exciting Plenary Talks by Professor Andrea L. Bertozzi, University of California Los Angeles, Professor Adilson E. Motter, Northwestern University, and Professor Kurt A. Wiesenfeld, Georgia Institute of Technology.

Our program can cover hot topics in variety of research areas, which gather under the term of ‘Nonlinear’. I would like to express my appreciation for all authors who submitted papers to NOLTA 2017. It is one of the traditional features of the technical programs in NOLTA that many special sessions are organized by leading researchers. The special sessions from wide research areas may raise new collaborations among symposium participants, which is quite important for succeeding NOLTA2017. I would like to express my thanks to the special session organizers and presenters. In addition, organizing and coordinating of NOLTA2017 are impossible without contributions and services of review committee members, reviewers, and session co-chairs. I am also equally thankful for Tom Wehner’s support of web-based services.

The poster area appears for finding NOLTA2017 student paper award winners, which is the second trial in NOLTA history. All the participants including students have a right to recommend the award-winner candidates. Please visit the poster area, discuss with students, and vote the award-winner candidates on the third day of the conference.

Finally, I would like to announce the Special Section related with NOLTA2017, which will be published in NOLTA, IEICE at April, 2019. The paper submission deadline is July 10, 2018. I hope that all authors, especially students, consider to submit the extended version of papers in this program to the Special Section.

I really hope participants to attend as many activities as possible, exchange and discuss ideas, enjoy the technical program and NOLTA2017!

Kiyohisa Natsume
Kyushu Institute of Technology
Technical Program Co-Chair, NOLT2017
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Kazuki Nakada (Hiroshima City University)
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<td>K. Aihara</td>
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<td>A. Ushida</td>
<td>Tokushima Bunri University</td>
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<td>P. Werbos</td>
<td>National Science Foundation, Retired</td>
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<td>A. H. Zemanian</td>
<td>State University NY at Stony Brook</td>
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Special Session Organizers

A1L-A Theory and Learning Applications of Koopman Operator Formalism

Organizers Yoshihiko Susuki (Osaka Prefecture University) and Igor Mezic (University of California, Santa Barbara)

A1L-B Systems Theory and its Applications

Organizer Toshimitsu Ushio (Osaka University)

A1L-C Complex systems, complex networks and bigdata analyses

Organizers Atsushi Tanaka (Yamagata University) and Michio Yokoyama (Yamagata University)

A1L-D Advanced Theory and Applications Related to Communication Quality

Organizers Kenko Ota (Nippon Institute of Technology) and Kyoko Yamori (Asahi University)

A1L-E Neuromorphic Systems and Electronic Devices 1

A2L-E Neuromorphic Systems and Electronic Devices 2

A3L-E-1 Neuromorphic Systems and Electronic Devices 3

Organizer Mutsumi Kimura (Ryukoku University)

A2L-A Network Function for Physically and Logically Coupled System

Organizers Takashi Hikihara (Kyoto University) and Vakhtang Putkaradze (University of Alberta)

A2L-D Complex Communication Sciences 1

A3L-D-1 Complex Communication Sciences 2

Organizer Naoki Wakamiya (Osaka University)

A3L-A Radio and Optical Wireless Communications 1

B2L-E Radio and Optical Wireless Communications 2

C0L-E Radio and Optical Wireless Communications 3

Organizers Yeon Ho Chung (Pukyong National University), Kazuki Maruta (Chiba University) and Satoshi Takahashi (Hiroshima City University)

A3L-C Laser Dynamics and Complex Photonics 1

B1L-C Laser Dynamics and Complex Photonics 2

Organizers Kazutaka Kanno (Fukuoka University), Fumiyoshi Kuwashima (Fukui University of Technology) and Atsushi Uchida (Saitama University)

B1L-A-1 Synchronization (SS)

Organizers Tetsuro Endo (Meiji University) and Wataru Kurebayashi (Aomori University)
**B1L-B-1**  Dynamical Brain and the Information Processing  
**Organizer** Kiyohisa Natsume (Kyushu Institute of Technology)

**B1L-D-1**  Dynamical Networks and Structure  
**Organizers** Luciano Buono (University of Ontario Institute of Technology) and Antonio Palacios (San Diego State University)

**B2L-A**  Nonlinear waves and localizations 1

**C0L-A**  Nonlinear waves and localizations 2  
**Organizers** Yusuke Doi (Osaka University) and Masayuki Kimura (Kyoto University)

**B2L-B**  Cellular Dynamical Systems 1

**C0L-B**  Cellular Dynamical Systems 2  
**Organizer** Hiroyuki Torikai (Kyoto Sangyo University)

**B2L-C**  Optimization Algorithms with Nonlinear Dynamics 1

**C0L-C**  Optimization Algorithms with Nonlinear Dynamics 2  
**Organizer** Hidehiro Nakano (Tokyo City University)

**B2L-D**  Nonlinear Circuits Distributed and Coupled across Nontrivial Network Topologies 1

**C0L-D**  Nonlinear Circuits Distributed and Coupled across Nontrivial Network Topologies 2  
**Organizers** Yoko Uwate (Tokushima University) and Tadashi Tsubone (Nagaoka University of Technology)

**C2L-A**  Switched Dynamical Systems: Modeling, Analysis, and Applications  
**Organizers** Mio Kobayashi (National Institute of Technology, Anan College) and Takuji Kousaka (Oita University)

**C2L-B**  Complex Networks and Systems  
**Organizer** Mikhail Prokhorov (Institute of Radio Engineering and Electronics of Russian Academy of Sciences)

**C2L-E-1**  Recent Progress in Optimization Algorithms using Nonlinear Techniques  
**Organizers** Takayuki Kimura (Nippon Institute of Technology) and Takafumi Matsuura (Nippon Institute of Technology)
Symposium Information

Symposium Venue

Cancun International Convention Center
Boulevard Kukulcán KM. 9 1er Piso, Zona Hotelera, 77500 Cancún, Q. Roo, Mexico

[Opening Ceremony & Plenary Talks]
Room 2 & A in COZUMEL on Floor 2

[Parallel Sessions]
Five rooms in COZUMEL on Floor 2

[Poster Session, presented by Award candidates]
Room A in COZUMEL on Floor 2

(The first floor is the floor immediately above the ground floor.)

Symposium Registration

Dec. 4, 17:00 – 19:00 on the Floor 2
Dec. 5, 08:00 – 18:00 on the Floor 2
Dec. 6, 08:00 – 17:00 on the Floor 2
Dec. 7, 08:00 – 15:30 on the Floor 2

Social Events

- Dec. 4, 19:00 – 21:00, Welcome reception: TERRACE AKUMAL on Floor 2
- Dec. 6, 19:00 – 21:00, Banquet: GRAN CANCUN on Floor 3
- Dec. 7, 16:00 – 17:30, Closing ceremony and Student paper award ceremony: Room 2&A in COZUMEL on Floor 2
Session Room Information

All session rooms are in COZUMEL on Floor 2.
Session at a Glance

December 5, 2017 (Tuesday)

Cancun International Convention Center

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<td>Opening ceremony&lt;br&gt;Place: Room 2&amp;A</td>
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<td>8:40–9:40</td>
<td>Plenary Talk 1, Prof. Andrea L. Bertozzi (University of California Los Angeles)&lt;br&gt;Chair: Antonio Palacios (San Diego State University)&lt;br&gt;Place: Room 2&amp;A</td>
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<td>9:40–10:25</td>
<td>Coffee break&lt;br&gt;Room 1&lt;br&gt;Room 2&amp;A&lt;br&gt;Room 3&lt;br&gt;Room 4&lt;br&gt;Room 5</td>
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<td>12:25–13:45</td>
<td>Lunch break</td>
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<td>15:25–15:40</td>
<td>Coffee break</td>
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<th>Room 3</th>
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<td>Plenary Talk 2</td>
<td>Prof. Adilson E. Motter (Northwestern University)</td>
<td>Chair: Luciano Buono (University of Ontario Institute of Technology)</td>
<td>Place: Room 2&amp;A</td>
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<td>10:15–12:35</td>
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<td>B1L-E</td>
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<td>Synchronization (SS)</td>
<td>Chairs: Wataru Kurebayashi and Tetsuro Endo</td>
<td>椅子: Christopher D. Cruz-Ancona</td>
<td>Laser Dynamics and Complex Photonics</td>
<td>Chairs: Luciano Buono and Antonio Palacios</td>
<td>Chaos and Bifurcation</td>
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<td>Nonlinear waves and localizations 1</td>
<td>Chair: Masayuki Kimura</td>
<td>Chair: Hiroyuki Torikai</td>
<td>Optimization Algorithms with Nonlinear Dynamics 1</td>
<td>Chairs: Yoko Uwate and Tadashi Tsubone</td>
<td>Radio and Optical Wireless Communications 2</td>
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<tr>
<td>Nonlinear waves and localizations 2</td>
<td>Chair: Masayuki Kimura</td>
<td>Chair: Hiroyuki Torikai</td>
<td>Optimization Algorithms with Nonlinear Dynamics 2</td>
<td>Chairs: Yoko Uwate and Tadashi Tsubone</td>
<td>Radio and Optical Wireless Communications 3</td>
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<td>19:00–21:00</td>
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<td>Banquet</td>
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<td>Place: GRAN CANCUN on Floor 3</td>
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## December 7, 2017 (Thursday)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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| 8:30–9:30| Plenary Talk 3, Prof. Kurt A. Wiesenfeld (Georgia Institute of Technology)  
Chair: Hisato Fujisaka (Hiroshima City University)  
Place: Room 2&A |
| 10:15–12:15 | Poster Session, presented by Award candidates  
Place: Room A |
| 12:15–13:35 | Lunch break |
| Room 1   | Room 2(&A)   | Room 3 | Room 4 | Room 5 |
Chairs: Mio Kobayashi and Takuji Kousaka  
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|          | C2L-B Complex Networks and Systems  
Chair: Mikhail Prokhorov  
Page xli |
|          | C2L-C Applied Mathematics / Self-Validating Numerics  
Chairs: Steve Huntsman and Tomoaki Okayama  
Page xlii |
|          | C2L-D Deep Learning / Optics  
Chairs: Takashi Matsubara and Michael J. Wishon  
Page xlii |
|          | C2L-E-1 Recent Progress in Optimization Algorithms using Nonlinear Techniques  
Chairs: Takayuki Kimura  
C2L-E-2 Optimization / Oscillations  
Chair: Yoshiki Sugitani  
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| 16:00–17:30 | Closing Ceremony and Student Paper Award Ceremony  
Place: Room 2&A |
Technical Program

Plenary Speakers

A0L-A-1 Mathematics of Crime  
Andrea L. Bertozzi (University of California Los Angeles)

B0L-A-1 Advantage of Diversity in Network Dynamics: Convergence Because of (not Despite) Differences  
Adilson E. Motter (Northwestern University)

C1L-A-1 Ultrashort-Pulse Trains in Optical Resonators: A Case of Spontaneous Synchronization?  
Kurt A. Wiesenfeld (Georgia Institute of Technology)

A1L-A Theory and Learning Applications of Koopman Operator Formalism

DATE: 2017/12/5 10:25–12:25  
ROOM: Room 1  
Chair: Yoshihiko Susuki (Osaka Prefecture University)

Igor Mezic (UCSB), Hassan Arbabi (UCSB)

A1L-A-2 Approximating the Continuous Spectral Measure of the Koopman Operator  
Marko Budisic (Clarkson University), Ryan Mohr (University of California, Santa Barbara)

A1L-A-3 Nonparametric Bayesian Learning of Koopman Spectrums in Nonlinear Dynamical Systems  
Yoshinobu Kawahara (Osaka University)

A1L-A-4 Modeling Nonlinear Dynamic System in RKHS through the Koopman Operator  
Satomi Sugaya (University of New Mexico), Yoshihiko Susuki (Osaka Prefecture University), Atushi Ishigame (Osaka Prefecture University), Andrea Mammoli (University of New Mexico), Manel Martinez-Ramon (University of New Mexico)
Dynamic Learning of Embeddings for Cognitive Classification from High-Dimensional Data
Jr-Shin Li (Washington University in St. Louis), Liang Wang (Washington University in St. Louis), Wei Zhang (Washington University in St. Louis)

Optimal Model Selection for Estimating Stochastic Koopman Modes
Wataru Kurebayashi (Aomori University), Sho Shirasaka (The University of Tokyo), Hiroya Nakao (Tokyo Institute of Technology)

A1L-B Systems Theory and its Applications
DATE: 2017/12/5 10:25–12:25
ROOM: Room 2
Chair: Toshimitsu Ushio (Osaka University)

Parametric Stability
Yuzo Ohta (Kobe University)

Sparse Optimization of Physical Distribution Systems Based on Maximum Hands-Off Control
Masaaki Nagahara (The University of Kitakyushu), Satoru Takahashi (Fujitsu Laboratories Ltd.), Hiroyuki Higuchi (Fujitsu Laboratories Ltd.), Tomoyoshi Takebayashi (Fujitsu Laboratories Ltd.)

Control of Singleton Attractors in Boolean Networks Based on Model Reduction
Koichi Kobayashi (Hokkaido University)

Obstacle Avoidance of 4-wheeled Vehicle Using Receding Horizon Control with iLQG Method Considering Computational Delay
Yun Qian (Osaka University), Toshimitsu Ushio (Osaka University)

Control of Nonholonomic Vehicle System Using Hierarchical Deep Reinforcement Learning
Naoyuki Masuda (Osaka University), Toshimitsu Ushio (Osaka University)

Asymptotic Stabilization of Nonholonomic Four-Wheeled Vehicle with Hysteresis Mechanism
Wataru Hashimoto (Hokkaido University), Yuh Yamashita (Hokkaido University), Koichi Kobayashi (Hokkaido University)

A1L-C Complex systems, complex networks and bigdata analyses
DATE: 2017/12/5 10:25–12:25
ROOM: Room 3
Chair: Atsushi Tanaka (Yamagata University)

Meta-Sanctions Game on Complex Networks

Minami Tsuchiya (Yamagata University), Atsushi Tanaka (Yamagata University), Muneki Yasuda (Yamagata University), Tomochika Harada (Yamagata University), Atsushi Tanaka (Yamagata University), Michio Yokoyama (Yamagata University)

Inhibition-Mediated Organization of Cortical Circuit Through the Spike-Timing-Dependent Plasticity

Taishi Matsumura (Department of Bio-Systems Engineering, Graduate School of Engineering, Yamagata University), Tetsuya Yuasa (Department of Bio-Systems Engineering, Graduate School of Engineering, Yamagata), Siu Kang (Department of Bio-Systems Engineering, Graduate School of Engineering, Yamagata)

A Fast Test Method for Noise Robustness of Deep Neural Networks

Muneki Yasuda (Yamagata University), Hironori Sakata (University of Tsukuba), Seungil Cho (Yamagata University), Tomochika Harada (Yamagata University), Atsushi Tanaka (Yamagata University), Michio Yokoyama (Yamagata University)

Multiple Sensor Data Acquisition System using Commonly Available Sensor Devices for Sleep and Car Conditions

Tomochika Harada (Yamagata University), Michio Yokoyama (Yamagata University), Seungil Cho (Yamagata University), Atsushi Tanaka (Yamagata University), Muneki Yasuda (Yamagata University)

Analysis of Social Networks and its Evaluation Using Big Data Analyzing Technique

Atsushi Tanaka (Yamagata University), Seungil Cho (Yamagata University), Muneki Yasuda (Yamagata University), Tomochika Harada (Yamagata University), Michio Yokoyama (Yamagata University)

Analysis of Controller Mismatch in AQM with Butterfly-Shaped Perfect Delay Compensator

Ryosuke Hotchi (Keio University), Ryogo Kubo (Keio University)

Networked Motion Control with Tamper Detection Observer and Smith Predictor

Jin Hoshino (Keio University), Takahiro Funakoshi (Keio University), Kenta Yamada (Keio University), Ryogo Kubo (Keio University)

A Tamper Detection Method Using Redundant Network Paths with Different Delays for Networked Control Systems

DATE: 2017/12/5 10:25–12:25
ROOM: Room 4
Chairs: Kenko Ota (Nippon Institute of Technology) and Kyoko Yamori (Asahi University)
A1L-E Neuromorphic Systems and Electronic Devices 1

DATE: 2017/12/5 10:25–12:25
ROOM: Room 5
Chair: Mutsumi Kimura (Ryukoku University)

A1L-E-1 Sign-Invariant Unsupervised Learning Facilitates Weighted-Sum Computation in Analog Neural-Network Devices
Itaru Hida (Hokkaido University), Kodai Ueyoshi (Hokkaido University), Shinya Takamaeda-Yamazaki (Hokkaido University), Masayuki Ikebe (Hokkaido University), Masato Motomura (Hokkaido University), Tetsuya Asai (Hokkaido University)

A1L-E-2 Brain-Like Synapse Oxide Thin-Film Transistors Gated by Solid Electrolytic Gate Insulators
Yeomyeong Kim (KyungHee Univ.), Giheon Kim (Electronics&Telecommunication Research Institute), Sungmin Yoon (KyungHee Univ.)

A1L-E-3 FPGA-Based Implementation of Digital Spike Maps
Tomoki Hamaguchi (HOSEI University), Toshimichi Saito (HOSEI University)

A1L-E-4 Development and Evaluation of Neural Networks Using Oxide Semiconductor Synapses for Letter Reproduction
Hiroki Yamane (Nara Institute of Science and Technology), Tomoya Kameda (Nara Institute of Science and Technology), Mutsumi Kimura (Nara Institute of Science and Technology), Yasuhiko Nakashima (Nara Institute of Science and Technology)

A1L-E-5 Brain-Like Integrated System Using Thin-Film Devices
Mutsumi Kimura (Nara Institute of Science and Technology), Tomoya Kameda (Nara Institute of Science and Technology), Yasuhiko Nakashima (Nara Institute of Science and Technology)

A1L-E-6 Polychronization in an Asynchronous Cellular Automaton Model of Spiking Neural Network
A2L-A Network Function for Physically and Logically Coupled System

DATE: 2017/12/5 13:45–15:25
ROOM: Room 1
Chairs: Takashi Hikihara (Kyoto University) and Vakhtang Putkaradze (University of Alberta)

A2L-A-1 A Model of Packetized Power Transfer Based on Density Flow
Takashi Hikihara (Kyoto University)

A2L-A-2 Signal Regularization Using Dynamics of Tree-Like Structures
Rochelle Nieuwenhuis (University of Alberta), Madoka Kubota (Fuji Electric), Morris Flynn (University of Alberta), Masayuki Kimura (Kyoto University), Takashi Hikihara (Kyoto University), Vakhtang Putkaradze (University of Alberta)

A2L-A-3 A bio-Inspired Pattern Dynamics of Power Flow in Consensus Networks
Hiroyasu Ando (Univ. of Tsukuba), Mikio Hasegawa (Tokyo Univ. of Science), Takashi Hikihara (Kyoto Univ.)

A2L-A-4 Coupled Piezoelectric Actuators for the Tactile Display
Suketu Naik (Weber State University), Dhanya Nair (Weber State University)

A2L-A-5 Detection of Responding Factors to External Perturbation in a Microbial Community
Shinji Nakaoka (JST PREST)

A2L-B Circuits and Systems / Analog and digital devices

DATE: 2017/12/5 13:45–15:25
ROOM: Room 2
Chairs: Salih Ergün (TUBITAK - Informatics and Information Security Research Center) and Yutaka Jitsumatsu (Kyushu University)

A2L-B-1 IC Prototyping of a Switched-Current a/D Converter Circuit Based on the Golden Ratio Encoder
Yoshihiko Horio (Tohoku University), Takayoshi Fujino (LAPIS Semiconductor Co., Ltd.)

A2L-B-2 Analysis and Simulation of a Chaos-Based Random Number Generator for Applications in Security
Salih Ergün (TUBITAK - Informatics and Information Security Research Center)

A2L-B-3 An Improved Formulation of Feature Values in Passive Reflectionless Transmission-Line Model Based on the Cochlea
Takemori Orima (Tohoku University), Yoshihiko Horio (Tohoku University)
A2L-B-4  A Programmable Architecture Based on Vectorized EVBDDs for Network Intrusion Detection Using Random Forests
Binbin Xue (Hiroshima City University), Shinobu Nagayama (Hiroshima City University), Masato Inagi (Hiroshima City University), Shin’Ichi Wakabayashi (Hiroshima City University)

A2L-B-5  Mean Square Quantization Error of Golden Ratio Encoders
Koji Itaya (Kyushu University), Yutaka Jitsumatsu (Kyushu University)

A2L-C Neural Networks / Biological Engineering

DATE: 2017/12/5 13:45–15:25
ROOM: Room 3
Chairs: Masaharu Adachi (Tokyo Denki University) and Tohru Ikeguchi (Tokyo University of Science)

A2L-C-1  Winner-Take-All Neural Network with Distributed Winner Search Circuit
Kazuki Hanada (Kansai University), Shoya Ueda (Kansai University), Hidetaka Ito (Kansai University), Hiroomi Hikawa (Kansai University)

A2L-C-2  Fast Construction of an Updating System for Intrusion Detection Using a Multi-Layer Extreme Learning Machine
Daichi Noguchi (Tokyo Denki University), Masaharu Adachi (Tokyo Denki University)

A2L-C-3  Continuous Learning of the Som with an Adaptive Neighborhood Function
Hikari Yoshimi (Kansai University), Hidetaka Ito (Kansai University), Hiroomi Hikawa (Kansai University)

A2L-C-4  Effect of Connectivity Weights of Inhibitory Neurons in Neuronal Avalanches
Mayu Aoki (Tokyo University of Science), Hideyuki Kato (Tokyo University of Technology), Yutaka Shimada (Tokyo University of Science), Kantaro Fujiwara (Tokyo University of Science), Tohru Ikeguchi (Tokyo University of Science)

A2L-C-5  Optimal Infrared Wave Length for Healing Pigmentations
Keiko Kohmoto (Kindai University), Fumiyoshi Kuwashima (Fukui University of Technology)

A2L-D Complex Communication Sciences 1

DATE: 2017/12/5 13:45–15:25
ROOM: Room 4
Chair: Naoki Wakamiya (Osaka University)

A2L-D-1  An Adaptive Throughput Guarantee Method Based on SP-Mac for WLAN
Hiroyasu Obata (Hiroshima City University), Chisa Takano (Hiroshima City University), Yuuki Yamamoto (Hiroshima City University)
A2L-D-2  Layer Specificity of Acquired Memory Duration in Multilayer LSTM Networks
Kazuki Hatanaka (Osaka University), Jun-Nosuke Teramae (Osaka University), Naoki Wakamiya (Osaka University)

A2L-D-3  Predictability of Financial Market Indexes by Deep Neural Network
Tomoya Onizawa (Ibaraki University), Takehiro Suzuki (Ibaraki University), Tomoya Suzuki (Ibaraki University)

A2L-D-4  A Coherent Ising Machine Applied to Asymmetric Traveling Salesman Problems
Yukio Murata (Tokyo University of Science), Kaori Kuroda (Tokyo University of Science), Mikio Hasegawa (Tokyo University of Science)

A2L-D-5  A Flooding Scheme in Wireless Sensor Networks Using a Discrete-Valued Neural Network
Hidehiro Nakano (Tokyo City University), Arata Miyauchi (Tokyo City University)

A2L-E Neuromorphic Systems and Electronic Devices 2

DATE: 2017/12/5 13:45–15:25
ROOM: Room 5
Chair: Mutsumi Kimura (Ryukoku University)

A2L-E-1  Implementation of Both Synapse and Neuron on a Field-Induced Insulator-to-2D Metal Transition Device with SrTiO$_3$ Channel
Pablo Stoliar (AIST & CIC nanoGUNE), Alejandro Schulman (AIST), Ai Kitoh (AIST), Isao Inoue (AIST)

A2L-E-2  Nonlinear Dynamics of Memristive Networks and its Application to Reservoir Computing
Gouhei Tanaka (The University of Tokyo), Ryosho Nakane (The University of Tokyo), Toshiyuki Yamane (IBM Research - Tokyo), Seiji Takeda (IBM Research - Tokyo), Daiju Nakano (IBM Research - Tokyo), Shigeru Nakagawa (IBM Research - Tokyo), Akira Hirose (The University of Tokyo)

A2L-E-3  Complex-Valued Neural Networks to Realize Energy-Efficient Neural Networks Including Reservoir Computing
Akira Hirose (The University of Tokyo), Seiji Takeda (IBM Research - Tokyo), Toshiyuki Yamane (IBM Research - Tokyo), Daiju Nakano (IBM Research - Tokyo), Shigeru Nakagawa (IBM Research - Tokyo), Ryosho Nakane (The University of Tokyo), Gouhei Tanaka (The University of Tokyo)

A2L-E-4  Towards a Neuromorphic Computing Hardware System
Yoshihiko Horio (Tohoku University)
A3L-A Radio and Optical Wireless Communications 1

DATE: 2017/12/5 15:40–18:20
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Chairs: Yeon Ho Chung (Pukyong National University) and Kazuki Maruta (Chiba University)

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A3L-B Complex Networks and Systems / Image and Signal Processing

DATE: 2017/12/5 15:40–18:20
ROOM: Room 2
Chairs: Shigeru Ninagawa (Kanazawa Institute of Technology) and Tomio Goto (Nagoya Institute of Technology)

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Tadayoshi Matsumori (Toyota Central R&D Labs., Inc.), Makito Oku (University of Tokyo), Kazuyuki Aihara (University of Tokyo)

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Masahiro Osogami (Department of Management and Information Sciences, Fukui University of Technology)

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Hiromasa Kohno (Kagawa University), Yuichi Tanji (Kagawa University), Ken’ichi Fujimoto (Kagawa University)

**A3L-B-5** A Diagonal Calibration Method of Images Using a Rectangular Object in the case when the Optical Axis is Unknown 241
Takashi Ozeki (Fukuyama University), Eiji Watanabe (Konan University)

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Koki Sato (tokyo university of science), Rei Nakagawa (tokyo university of science), Satoshi Kodama (tokyo university of science)

A3L-C Laser Dynamics and Complex Photonics 1

DATE: 2017/12/5 15:40–18:20
ROOM: Room 3
Chairs: Kazutaka Kanno (Fukuoka University) and Fumiyoshi Kuwashima (Fukui University of Technology)

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A3L-C-2 Optical Implementation of Reservoir Computing for Fast Integrative Analysis in Sensor Array Processing
Tadashi Okumura (Hitachi, Ltd.), Mitsuharu Tai (Hitachi, Ltd.), Masahiko Ando (Hitachi, Ltd.)

A3L-C-3 Experiment on Temporal Mask Effect in Laser Dynamical Reservoir Computing
Yoma Kuriki (Saitama University), Kosuke Takano (Saitama University), Chihiro Sugano (Saitama University), Atsushi Uchida (Saitama University)

A3L-C-4 Information Processing Based on an External-Cavity Semiconductor Laser with Optical Feedback-Phase Modulation
Kazutaka Kanno (Fukuoka University), Chihiro Sugano (Saitama University), Kousuke Takano (Saitama University), Atsushi Uchida (Saitama University), Masatoshi Bunsen (Fukuoka University)

A3L-C-5 Assimilating nonlinear dynamics with FORCE-learning : A perspective from chaotic synchronization
Hiromichi Suetani (Oita University)

A3L-C-6 Control of Wavefront Propagation in Two-Dimensional Bistable System
Takashi Isoshima (RIKEN)

A3L-C-7 Adaptation of Decision Making with Chaotic Semiconductor Laser
Takatomo Mihana (Saitama University), Yuta Terashima (Saitama University), Makoto Naruse (National Institute of Information and Communications Technology), Song-Ju Kim (Graduate School of Media and Governance, Keio University), Atsushi Uchida (Saitama University)

A3L-C-8 Dynamics of Stable-Unstable Switching of a Laser Diode Subject to Feedback
Jia-Xin Dong (City University of Hong Kong), Song-Sui Li (City University of Hong Kong), Sze-Chun Chan (City University of Hong Kong)

A3L-D-1 Complex Communication Sciences 2
DATE: 2017/12/5 15:40–18:20
ROOM: Room 4
Chair: Naoki Wakamiya (Osaka University)

A3L-D-1-1 Multi-Objective Particle Swarm Optimizer Networks with Tree Topology
Kyosuke Miyano (Tokyo City University), Hidehiro Nakano (Tokyo City University), Arata Miyauchi (Tokyo City University)

A3L-D-1-2 Signal Reception and Phase Detection with Nano-Mechanical Vibration for Em-Based Nanoscale Digital Communication
Yukihiro Tadokoro (TOYOTA Central R&D Lab., Inc.), Yutaka Ohno (Nagoya university), Hiroya Tanaka (TOYOTA Central R&D Lab., Inc.)
A3L-D-1-3 A Stochastic Resonance Receiver for 4-PAM Signals
Yasuo Nakashima (Nagoya University), Takaya Yamazato (Nagoya University), Yukihiro Tadokoro (TOYOTA Central R&D Labs.), Shintaro Arai (Okayama University of Science)

A3L-D-1-4 Partialization Analysis for Estimating Hub Network Topology
Kaori Kuroda (Tokyo University of Science), Takuya Matsumoto (Tokyo University of Science), Mikio Hasegawa (Tokyo University of Science)

A3L-D-2 Complex Networks and Systems / Image and Signal Processing
DATE: 2017/12/5 15:40–18:20
ROOM: Room 4
Chair: Abdelali El Aroudi (Universitat Rovira i Virgili)

A3L-D-2-1 Operational Evaluation of Self-Powered Landslide Disasters Monitoring System
Tatsuya Furukawa (hiroshima city university), Koichi Shin (hiroshima city university), Masahiro Nishi (hiroshima city university)

A3L-D-2-2 Out of Maximum Power Point of a PV System Because of Subharmonic Oscillations
Abdelali El Aroudi (Universitat Rovira i Virgili)

A3L-D-2-3 Steady-State Analytical Expression of Voltage Shift in Resonant Drivers with Clamp Diode
Hanako Matsubara (Chiba University), Xiuqin Wei (Chiba Institute of Technology), Hiroo Sekiya (Chiba University)

A3L-E-1 Neuromorphic Systems and Electronic Devices 3
DATE: 2017/12/5 15:40–18:20
ROOM: Room 5
Chair: Mutsumi Kimura (Ryukoku University)

A3L-E-1-1 A Model for Amorphous Oxide Semiconductor (AOS) Devices to Mimic Synaptic Transmission Behaviors
Karim Khan (Ningbo Institute, Chinese Academy of Sciences), Weiliang Wang (Ningbo Institute, Chinese Academy of Sciences), Mingzhi Dai (Ningbo Institute, Chinese Academy of Sciences), Mutsumi Kimura (Ryukoku University)

A3L-E-1-2 Adaptive-Learning Functions of Ferroelectric Field-Effect Transistors for Synaptic Device Applications
Sung-Min Yoon (Kyung Hee University), Eom-Ji Kim (Kyung Hee University), Yeo-Myeong Kim (Kyung Hee University), Hiroshi Ishiwara (Tokyo Institute of Technology)
A3L-E-2 Machine Learning / Evolutionary computations

DATE: 2017/12/5 15:40–18:20
ROOM: Room 5
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A3L-E-2-6  PSO-RP : Particle Swarm Optimization with Refractory Period of Particle Velocity Update  338
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B1L-A-1 Synchronization (SS)

DATE: 2017/12/6 10:15–12:35
ROOM: Room 1
Chairs: Wataru Kurebayashi (Aomori University) and Tetsuro Endo (Meiji University)

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B1L-A-1-2  Noise-Induced Synchronization of Pierce Oscillators  343
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Adrian Arellano-Delgado (CONACYT-UABC Universidad Autonoma de Baja California), Rosa
B1L-A-2 Synchronization (RS)

DATE: 2017/12/6 10:15–12:35
ROOM: Room 1
Chair: Christopher D. Cruz-Ancona (Center for Research and Advanced Studies of the National Polytechnic Institute)

B1L-A-2-1 Muscles Excite and Synchronize Themselves Through Their Intrinsic Dynamics
Yoichi Masuda (Department of Mechanical Engineering, Osaka University), Masato Ishikawa (Department of Mechanical Engineering, Osaka University)

B1L-A-2-2 Fractional Generalized Quasi-Synchronization of Incommensurate Fractional Order Oscillators
Claudia Alejandra Perez-Pinacho (CINVESTAV-IPN), Rafael Martinez-Guerra (CINVESTAV-IPN), Christopher Diego Cruz-Ancona (CINVESTAV-IPN)

B1L-A-2-3 Synchronization of Piece-Wise Linear Oscillators Using Time Delay Approximations
Manuel Alberto Lizarraga-Lizarraga (CICESE), Luis Alejandro Marquez-Martinez (CICESE), Jonatan Pena-Ramirez (CICESE)

B1L-B-1 Dynamical Brain and the Information Processing

DATE: 2017/12/6 10:15–12:35
ROOM: Room 2
Chair: Kiyohisa Natsume (Kyushu Institute of Technology)

B1L-B-1-1 Efficient Control of Theta Traveling Waves by Synchronized Inhibition Through Gap Junctions and GABAergic Connections in a Hippocampal CA3 Model
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Hideyuki Kato (Tokyo University of Technology)

**B1L-B-2-2 Mathematical Model of TRPM2 Activation in Pancreatic β-Cells**

Kantaro Fujiwara (Tokyo University of Science), Hiroyasu Ando (Tsukuba University), Tohru Ikeguchi (Tokyo University of Science), Masashi Yoshida (Jichi Medical University), Masafumi Kakei (Saitama Citizens Medical Center)

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Takeru Aoki (The University of Electro-Communications), Keiki Takadama (The University of Electro-Communications), Hiroyuki Sato (The University of Electro-Communications)

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Damián Gulich (Instituto de Física de Líquidos y Sistemas Biológicos, CONICET, UNLP)

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ROOM: Room 5  
Chairs: Hidetaka Ito (Kansai University) and Masahiro Wada (Konan University)

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Masayuki Kimura (Kyoto University)

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B2L-B Cellular Dynamical Systems 1

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Chair: Hiroyuki Torikai (Kyoto Sangyo University)

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B2L-C-2  Particle Swarm Optimization for Calculating Local Bifurcation Point in One-Dimensional Discrete Dynamical Systems
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Haru Hikita (Nagaoka University of Technology), Yoshikazu Yamanaka (Utsunomiya University), Tadashi Tsubone (Nagaoka University of Technology)

B2L-C-4  A Study of PCMPSO
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**B2L-D-2** Fault Tolerance of Boost Converters Coupled by WTA Switching  
Kaito Ando (Hosei University), Toshimichi Saito (HOSEI University)

**B2L-D-3** Synchronization Phenomena due to Changes in Network Structure of Coupled Chaotic Circuits in Complex Networks  
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**B2L-D-4** Amplitude Reduction of Piecewise-Constant Oscillators Coupled by Hysteresis Elements  
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Hakui Teki (Osaka Prefecture University), Keiji Konishi (Osaka Prefecture University), Naoyuki Hara (Osaka Prefecture University)

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**B2L-E** Radio and Optical Wireless Communications 2

ROOM: Room 5  
Chairs: Yeon Ho Chung (Pukyong National University) and Kazuki Maruta (Chiba University)

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**B2L-E-3** Majority Determination and Subcarrier Diversity of Detecting Broadcaster Advised Emergency Wake-Up Signal for ISDB-T Television Receivers  
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**B2L-E-4** A Numerical Model of a Frequency Discriminator for Terahertz Sensing and Communication Using Photoelectric Detectors  
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Chair: Masayuki Kimura (Kyoto University)

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Sergey Dmitriev (Institute for Metals Superplasticity Problems, Russian Academy of Sciences), Nikolay Medvedev (Biysk Technological Institute, 27 Trofinova St., 659305 Biysk, Russia), Elena Korznikova (Institute for Metals Superplasticity Problems, Russian Academy of Sciences), Alexander Chetverikov (Saratov Chernyshevsky State University, 83 Astrakhanskaya St., 410012 Saratov, Russia), Manuel Velarde (Instituto Pluridisciplinar, UCM, Paseo Juan XXIII 1, 28040 Madrid, Spain)

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Mariko Tanaka (The University of Electro-Communications), Yuki Yamagishi (NS Solutions Corporation), Hidetoshi Nagai (NS Solutions Corporation), Hiroyuki Sato (The University of Electro-Communications)

C0L-D Nonlinear Circuits Distributed and Coupled across Nontrivial Network Topologies 2

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Analysis of Bifurcation Phenomena of Coupled Piecewise-Constant Hysteresis Oscillators  
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C0L-D-2  
Stability Analysis of Partial Amplitude Death on Five Delay-Coupled Stuart-Landau Oscillators  
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C0L-D-3  
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Yoko Uwate (Tokushima University), Yoshifumi Nishio (Tokushima University)

**Generalized Multi-Synchronization of Chaotic Systems via Dynamical Control Laws: Stability of Synchronization Manifold**

Christopher Diego Cruz-Ancona (CINVESTAV-IPN), Rafael Martinez-Guerra (CINVESTAV-IPN), Claudia Alejandra Perez-Pinacho (CINVESTAV-IPN)

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**C0L-E Radio and Optical Wireless Communications 3**

DATE: 2017/12/6 15:50–17:10
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Chairs: Yeon Ho Chung (Pukyong National University) and Kazuki Maruta (Chiba University)

**C0L-E-1 Non-Linear Compensation for Cap64 Modulation in Visible Light Communication System**

Nan Chi (Fudan University), Xingyu Lu (Fudan University), Liang Qiao (Fudan University), Yingjun Zhou (Fudan University), Can Wang (Fudan University)

**C0L-E-2 Investigation of Optical Interference Noise Characteristics in Visible Light Communication System**

Trio Adiono (Microelectronics Center, Institut Teknologi Bandung), Syifaul Fuada (School of Electrical Engineering and Informatics, Institut Teknologi Bandung)

**C0L-E-3 Optical Interference Noise Filtering Over Visible Light Communication System Utilizing Analog High-Pass Filter Circuit**

Trio Adiono (Microelectronics Center, Institut Teknologi Bandung), Syifaul Fuada (School of Electrical Engineering and Informatics, Institut Teknologi Bandung)

**C0L-E-4 Angle of Light Arrival Estimation for Non-Line-of-Sight Optical Camera Communications**

Tahesin Samira Delwar (Pukyong National University), Willy Anugrah Cahyadi (Pukyong National University), Yeon Ho Chung (Pukyong National University), Chang-Jun Ahn (Chiba University)

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**C2L-A Switched Dynamical Systems: Modeling, Analysis, and Applications**

DATE: 2017/12/7 13:35–15:55
ROOM: Room 1
Chairs: Mio Kobayashi (National Institute of Technology, Anan College) and Takuji Kousaka (Oita University)

**C2L-A-1 Behavioral Modeling of Switched Descriptor System via Backward Euler Method**

Tomoya Nishimura (Kagawa University), Yuichi Tanji (Kagawa University)

**C2L-A-2 Design of Electronic Circuit Model of Neural System Based on Hybrid Dynamical System**

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Yuu Miino (Tokushima University), Tetsushi Ueta (Tokushima University), Hiroshi Kawakami (Tokushima University)

Acoustic Effect Using Chaos Controlled by an External Signal
Hironori Kumeno (National institute of technology, Niihama college)

Experimental Study on Vibration Characteristics in Vibration Cutting Process
Shu Karube (National Institute of Technology, Oita College)

Control of Chaotic Itinerancy Observed in Coupled Systems of One-Dimensional Gauss Maps by Switching Coupling
Mio Kobayashi (National Institute of Technology, Anan College), Tetsuya Yoshinaga (Tokushima University)

C2L-B Complex Networks and Systems

DATE: 2017/12/7 13:35–15:55
ROOM: Room 2
Chair: Mikhail Prokhorov (Institute of Radio Engineering and Electronics of Russian Academy of Sciences)

Collective Dynamics in Networks of Bistable Time-Delayed Feedback Oscillators Coupled via the Mean Field
Mikhail Prokhorov (Institute of Radio Engineering and Electronics of Russian Academy of Sciences), Danil Kulminskiy (Institute of Radio Engineering and Electronics of Russian Academy of Sciences), Vladimir Ponomarenko (Institute of Radio Engineering and Electronics of Russian Academy of Sciences)

Network Analysis of Epileptic Brain
Alexander Hramov (Saratov State Technical University), Vladimir Maksimen (Saratov State Technical University), Annika Luttjohann (University of Munster), Vladimir Makarov (Saratov State Technical University), Mikhail Goremyko (Saratov State Technical University), Alexey Koronovski (Saratov State University), Vladimir Nedaivozov (Saratov State University), Anastasia Runnova (Saratov State University), Gilles Van Luijtelaar (Radboud University),

Self-Similarity in Explosive Transition to/from Synchronization in Random Networks
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Interaction Between Numerous Oscillatory Processes in the Human Cardiovascular System
Vladimir Ponomarenko (Saratov Branch of Kotel’nikov Institute of Radio Engineering and Electronics of RAS), Anatoly Karavaev (Saratov Branch of Kotel’nikov Institute of Radio Engineering and
Electronics of RAS), Yuri Ishbulatov (Saratov Branch of Kotel’nikov Institute of Radio Engineering and Electronics of RAS), Anton Kiselev (Saratov State Medical University n.a. V. I. Razumovsky), Mikhail Prokhorov (Saratov Branch of Kotel’nikov Institute of Radio Engineering and Electronics of RAS)

**C2L-B-5** Coherent Resonance in Neuronal Networks Under External Signal Influence

Andrey Andreev (Yuri Gagarin State Technical University of Saratov), Alexander Hramov (Yuri Gagarin State Technical University of Saratov), Vladimir Makarov (Yuri Gagarin State Technical University of Saratov), Svetlana Pchelintseva (Yuri Gagarin State Technical University of Saratov), Anastasia Runnova (Yuri Gagarin State Technical University of Saratov), Alexander Pisarchik (Center for Biomedical Technology)

**C2L-C Applied Mathematics / Self-Validating Numerics**

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ROOM: Room 3  
Chairs: Steve Huntsman (BAE Systems plc) and Tomoaki Okayama (Hiroshima City University)

**C2L-C-1** Topological Density Estimation
Steve Huntsman (BAE Systems)

**C2L-C-2** Finding All Local Optima and All Real Roots Without Derivatives Using Mathematical Structures of Univariate Continuous Functions on an Interval
Hideo Kanemitsu (Hokkaido University of Education)

**C2L-C-3** Nonlinear Response Theory of Electronic Transport in graphene
Seiichi Kuwata (hiroshima city university), Hisato Fujisaka (hiroshima city university)

**C2L-C-4** On Stability of State-Dependent Homogeneous Systems
Kenta Hoshino (Aoyama Gakuin University)

**C2L-C-5** Explicit Error Bound for Muhammad-Mori’s SE-Sinc Indefinite Integration Formula over the Semi-Infinite Interval
Ryota Hara (Hiroshima City University), Tomoaki Okayama (Hiroshima City University)

**C2L-D Deep Learning / Optics**

DATE: 2017/12/7 13:35–15:55  
ROOM: Room 4  
Chairs: Takashi Matsubara (Kobe University) and Michael J. Wishon (Georgia Tech Lorraine)

**C2L-D-1** A Modeling of Eigen-States in In0.53Ga0.47As/In0.52Al0.48As Multi-Quantum Wells Structure Using Photocurrent Spectroscopy
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