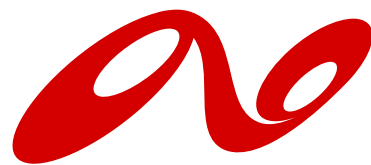


The 2021 NonLinear Science Workshop



December 6th-8th, 2021
Virtual online conference
NOLTA Society, IEICE

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The 2021 Nonlinear Science Workshop

Virtual online conference
December 6th-8th, 2021

Organizer

NOLTA society, IEICE
<http://www.ieice.org/nolta/>

Organizing committee :

General Chair	Kenya Jin'no	(Tokyo City University)
Technical Program Chair	Yutaka Shimada	(Saitama University)
Finance Chair	Hidehiro Nakano	(Tokyo City University)
Publication Chair	Hiroaki Kurokawa	(Tokyo University of Technology)
Conference System Secretary	Yuu Miino	(Tokyo University of Technology)
General Secretary	Takafumi Matsuura	(Nippon Institute of Technology)

Welcome Message from the General Chair

Dear Colleagues,

On behalf of the Organizing Committee we welcome you to the 2021 Nonlinear Science Workshop (NLSW2021). This event was planned due to the postponement of the NOLTA conference, the IEICE NOLTA Society's annual flagship conference, due to COVID-19. The NOLTA conference is a unique international conference on the nonlinear theory and its applications. It is also a very important conference with a mission to encourage young researchers. The NOLTA Society believes that it would be a great loss for researchers in this field, especially for young researchers, if such a conference is not held in 2021. Therefore, we have planned this conference as an alternative to the NOLTA conference. The NLSW2021 is held as a fully online workshop from December 6th through December 8th, 2021 in these difficult times.

The NLSW2021 is provided researchers in the fields of nonlinear science with good opportunities to exchange innovative ideas and to discuss future research directions covering a wide range of topics. In addition, encouraging promising students and young researchers is a key objective. The organizing committee believes that students will benefit from discussions and many interesting papers. The NLSW2021 includes 67 paper presentations and one panel discussion. All papers have been reviewed by at least two referees.

We would like to thank all participants for their contributions, both papers and presentations, and acknowledge the organizing committee members for their time and efforts devoted to paper reviews and technical program organization.

Finally, we expect that this workshop would further promote and encourage new research and development in the nonlinear science fields world wide.



Kenya Jin'no
Tokyo City University, Japan
General Chair, NLSW2021

Conference Information

Conference Venue

Online

Visit https://nlsw2021.org/session_info.html for further information.

Presentation Instructions

The online workshop will be held using Zoom. Live presentation will be streamed ontime by the author via screen sharing of Zoom.

- Please check the Session Schedule to see on which day and at what time you are presenting your contribution.
- Total duration of each contribution is 18 minutes. This includes the time available for presentation (14-15 minutes) and questions from the audience (3-4 minutes).
- Speakers should log in to their session rooms of Zoom at least 10 minutes before the start of the session to check your audio and screen sharing, and to contact the chairperson.
- The workshop staff are not responsible for the operation of computer-related equipment belonging to participants.

Session Room Information

Zoom meeting(Main Room)	Opening ceremony, Panel Discussion, and Closing ceremony
Breakout room 1 (Room A)	Session room via on-line
Breakout room 2 (Room B)	Session room via on-line

Technical Program

December 6th, 2021

10:00–15:20

6AM-A(Room A, 10:50 - 12:10)

Chair: Hideyuki Kato (Oita University)

6AM-A-1 addHessian: Combining quasi-Newton method with first-order method for neural network training NLSW-1

Sota Yasuda (Shizuoka University), S Indrapriyadarsini (Shizuoka University), Hiroshi Ninomiya (Shonan Institute of Technology), Takeshi Kamio (Hiroshima City University), Hideki Asai (Shizuoka University)

6AM-A-2 Extreme Learning Machine Using Nonlinear Frequency Dependence of Fluorescence Amplitude Modulation NLSW-2

Shoichi Hanano (Osaka University), Masaki Nakagawa (Osaka University), Sho Shirasaka (Osaka University), Hideyuki Suzuki (Osaka University)

6AM-A-3 Digital Implementation of a Multilayer Perceptron Based on Stochastic Computing with Online Learning Function NLSW-3

Yoshiaki Sasaki (Hokkaido University), Seiya Muramatsu (Hokkaido University), Kohei Nishida (Hokkaido University), Megumi Akai-Kasaya (Hokkaido University), Tetsuya Asai (Hokkaido University)

6AM-A-4 Multiobjective optimization problems in Simple Recurrent Neural Networks NLSW-4

Kento Saka (HOSEI University), Toshimichi Saito (HOSEI University)

6AM-B(Room B, 10:50 - 12:10)

Chair: Kien Nguyen (Chiba University)

6AM-B-1 Analysis of a One-Dimensional Model of DC-DC Converter with TEM NLSW-5

Shota Uchino (Okayama University of Science), Kousaka Takuji (Chukyo University), Satoshi Aoki (Okayama University of Science), Hiroyuki Asahara (Okayama University of Science)

6AM-B-2 A novel ergodic cellular automaton model of delay differential equation toward efficient hardware-based genome simulator NLSW-6

Shogo Shirafuji (Hosei University), Hiroyuki Torikai (Hosei University)

6AM-B-3 A qualitative property of doubly nested MMOs versus angular frequency NLSW-7

Kaito Kato (Chukyo University), Naohiko Inaba (Shonan Institute of Technology), Takuji Kousaka (Chukyo University)

6AM-B-4 Backward-Time Dynamics in an RLC circuit with an inverted diode NLSW-8

Tetsushi Ueta (Tokushima University)

6PM-A(Room A, 13:40 - 15:20)

Chair: Yuichi Katori (Future University Hakodate)

6PM-A-1 Preliminary Experimental Results of a Stacked 3D Cyclic Chaotic Neural Network Reservoir Integrated Circuit NLSW-9

Takemori Orima (Tohoku University), Yoshihiko Horio (Tohoku University)

6PM-A-2 Evaluation of Spintronics-Based Spiking Neural Networks Using Hebbian Learning Rule NLSW-10

Yushi Kikuchi (Tohoku University)

6PM-A-3 On the study of Memory-Less quasi-Newton Method with Momentum Term for Neural Network Training NLSW-11

Shahrzad Mahboubi (Shonan Institute of Technology), Ryo Yamatomi (Shonan Institute of Technology), Indrapriyadarsini S (Shizuoka University), Hiroshi Ninomiya (Shonan Institute of Technology), Hideki Asai (Shizuoka University)

6PM-A-4 Robustness Evaluation of Direct Feedback Alignment Learning for Analog VLSI Neural Networks with Non-idealities in Weight-updates NLSW-12

Naoki Nagamatsu (NIT, Kurume College), Hideki Murakami (NIT, Kurume College), Seiji Uenohara (Kyushu Inst. Tech.), Takashi Morie (Kyushu Inst. Tech.)

6PM-A-5 A Heuristic Model for Configurable Polymer-wire Synaptic Devices NLSW-13

Yoshiki Amemiya (Hokkaido University), Ali Jose (Hokkaido University), Naruki Hagiwara (Hokkaido University), Megumi Akai (Hokkaido University), Tetsuya Asai (Hokkaido University)

6PM-B(Room B, 13:40 - 15:20)

Chair: Hiroyuki Asahara (Okayama University of Science)

6PM-B-1 Bifurcation Point Detection with Parallel Nested Layer Particle Swarm Optimization NLSW-14

Tomo Hasegawa (Tokyo University of Technology), Haruna Matsushita (Kagawa University), Takuji Kousaka (Chukyo University), Hiroaki Kurokawa (Tokyo University of Technology)

6PM-B-2 Homoclinic bifurcation analysis for logistic map NLSW-15

Yuu Miino (Tokyo University of Technology), Tetsushi Ueta (Tokushima University)

6PM-B-3 Calculation method for unstable periodic points in unimodal maps using symbolic dynamical system NLSW-16

Yuu Miino (Tokyo University of Technology), Tetsushi Ueta (Tokushima University)

6PM-B-4 A Method to Obtain Variational Equations Automatically by Applying Symbolic Differentiation NLSW-17

Seiya Amoh (Tokushima University), Miho Ogura (Tokushima University), Tetsushi Ueta (Tokushima University)

6PM-B-5 Dynamics of miners' decision making under taxation in blockchain NLSW-18

Kosuke Toda (Osaka University), Naomi Kuze (Osaka University), Toshimitsu Ushio (Osaka University)

7AM-A(Room A, 10:30 - 12:10)**Chair: Naomi Kuze (Osaka University)****7AM-A-1 Relationship between similarities of inter-point distance distributions on attractors and reconstruction parameters** NLSW-19

Kazuya Sawada (Tokyo University of Science), Yutaka Shimada (Saitama University), Tohru Ikeguchi (Tokyo University of Science)

7AM-A-2 A Mode-in-State Contribution Factor based on Koopman Mode Decomposition and its Application to Power System Analysis NLSW-20

Kenji Takamichi (Osaka Prefecture University), Yoshihiko Susuki (Osaka Prefecture University), Atsushi Ishigame (Osaka Prefecture University)

7AM-A-3 Evaluations of Inverse Permutations based on Compositions of Permutations NLSW-21

Yuuki Saitou (Sojo University), Daisaburo Yoshioka (Sojo University)

7AM-A-4 A Global Lyapunov Function for the Coherent Ising Machine NLSW-22

Jaijeet Roychowdhury (University of California, Berkeley)

7AM-A-5 Evaluation and Optimization of Asynchronous Pulse Code Multiple Access Scheme NLSW-23

Naoki Wakamiya (Osaka University), Kenji Leibnitz (NICT), Ferdinand Peper (NICT), Mikio Hasegawa (Tokyo University of Science)

7AM-B(Room B, 10:30 - 12:10)**Chair: Sho Shirasaka (Osaka University)****7AM-B-1 Benchmarks for Reservoir Computing Based on Pseudo-Billiard Dynamics in Hypercube** NLSW-24

Yamato Sakino (Future University Hakodate), Hakaru Tamukoh (Kyushu Institute of Technology), Takashi Morie (Kyushu Institute of Technology), Yuichi Katori (Future University Hakodate)

7AM-B-2 Consideration of the Output Series Generated by Hysteresis Reservoir Computing NLSW-25

Tsukasa Saito (Tokyo City University), Kenya Jin'no (Tokyo City University)

7AM-B-3 Enhancement of the Learning Performance by Introducing Dual Topology into an Echo State Network NLSW-26

Renya Kitagawa (Chiba Institute of Technology), Sou Nobukawa (Chiba Institute of Technology)

7AM-B-4 An Information Theoretic Design for MEMS-based Reservoir Computing NLSW-27

Kazuki Nakada (TDK Corporation), Shunya Suzuki (TDK Corporation), Eiji Suzuki (TDK Corporation), Yukio

Terasaki (TDK Corporation), Tomoyuki Sasaki (TDK Corporation), Tetsuya Asai (Hokkaido University)

7AM-B-5 A novel hardware-efficient polychronous reservoir network based on asynchronous cellular automaton dynamics NLSW-28

Naoki Kato (Hosei University), Hiroyuki Torikai (Hosei University)

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Chair: Haruna Matsushita (Kagawa University)

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Riku Takatou (Tokyo City University), Kenya Jinno (Tokyo City University)

7PM1-A-2 An algorithm of differential evolution with perturbation for optimization problem NLSW-30

Takuya Muto (Fukuoka Inst of Tech), Michiharu Maeda (Fukuoka Inst of Tech)

7PM1-A-3 An Algorithm of Set-Based Particle Swarm Optimization with Memory for Optimization Problem NLSW-31

Yuta Chikuba (Fukuoka Inst of Tech), Takahiro Hino (Fukuoka Inst of Tech), Michiharu Maeda (Fukuoka Inst of Tech)

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Honami Tsushima (Tokyo University of Science), Tohru Ikeguchi (Tokyo University of Science)

7PM1-A-5 Approximating the search distribution of particle swarm optimization using mixture distribution NLSW-33

Yoshikazu Yamanaka (Utsunomiya University)

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Chair: Daisaburo Yoshioka (Sojo University)

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Yuichiro Tanaka (Kyushu Institute of Technology), Hakaru Tamukoh (Kyushu Institute of Technology)

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Masaya Muramatsu (Osaka University), Sho Shirasaka (Osaka University), Masaki Nakagawa (Osaka University), Hideyuki Suzuki (Osaka University)

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Hiroshi Kubota (Hokkaido University), Tsuyoshi Hasegawa (Hokkaido University), Megumi Akai (Hokkaido University), Tetsuya Asai (Hokkaido University)

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Yoshihiro Yonemura (Future University Hakodate), Yuichi Katori (Future University Hakodate)

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Yu Yoshino (Future University Hakodate), Yuichi Katori (Future University Hakodate)

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Yutaro Komiyama (Chiba University), Shuya Matsushashi (Chiba University), Wenqi Zhu (Chiba University), Kien Nguyen (Chiba University), Takeshi Uematsu (Omron Corporation), Yuki Ito (Omron Corporation), Taichi Mishima (Omron Corporation), Hiroo Sekiya (Chiba University)

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Ryutaro Fujikawa (Hosei University), Toshimichi Saito (Hosei University)

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Kentaro Takeda (Hosei University), Hiroyuki Torikai (Hosei University)

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Ryota Ujifuku (Hosei University), Hiroyuki Torikai (Hosei University)

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Masanao Yasumuro (Tokyo City University), Kenya Jin'no (Tokyo City University)

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Yuto Makabe (Hosei University), Hiroyuki Torikai (Hosei University)

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Yui Kishimoto (Hosei University), Hiroyuki Torikai (Hosei University)

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Taichi Fukawa (Tokyo City University), Kenya Jin'no (Tokyo City University)

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Takuma Nakamichi (Ibaraki University), Ryouhei Yoshida (Ibaraki University), Riku Tanaka (Daiwa Asset Management), Tomoya Suzuki (Ibaraki University)

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Hideyuki Kato (Oita University)

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Naoki Nakajima (Tamagawa University), Tadanobu Kamijo (University of the Ryukyus), Takeshi Aihara (Tamagawa University), Hirofumi Hayakawa (Tamagawa University)

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Kensuke Takada (Kyushu Institute of Technology), Katsumi Tateno (Kyushu Institute of Technology)

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Chair: Takeshi Kamio (Hiroshima City University)

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Momo Ando (Chiba Institute of Technology), Sou Nobukawa (Chiba Institute of Technology), Mitsuru Kikuchi (Kanazawa University), Tetsuya Takahashi (University of Fukui)
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 Kohei Nishida: NLSW-3(6AM-A-3)
 Haruhiko Nishimura: NLSW-64(8PM-B-1)
 Sou Nobukawa: NLSW-26(7AM-B-3),
 NLSW-57(8AM-B-4),
 NLSW-64(8PM-B-1),
 NLSW-65(8PM-B-2)
 Daisuke Oguchi: NLSW-61(8PM-A-3)
 Miho Ogura: NLSW-17(6PM-B-4)
 Takemori Orima: NLSW-9(6PM-A-1)
 Tsuyoshi Otake: NLSW-63(8PM-A-5)
 Fedinand Peper: NLSW-23(7AM-A-5)
 Jaijeet Roychowdhury: NLSW-22(7AM-A-4)
 Indrapriyadarsini S: NLSW-11(6PM-A-3)
 Toshimichi Saito: NLSW-4(6AM-A-4),
 NLSW-41(7PM2-A-3)
 Tsukasa Saito: NLSW-25(7AM-B-2)
 Yuuki Saitou: NLSW-21(7AM-A-3)
 Kento Saka: NLSW-4(6AM-A-4)
 Yuuki Sakakibara: NLSW-66(8PM-B-3)
 Yamato Sakino: NLSW-24(7AM-B-1)
 Yoshiaki Sasaki: NLSW-3(6AM-A-3)
 Tomoyuki Sasaki: NLSW-27(7AM-B-4)
 Shigeo Sato: NLSW-61(8PM-A-3),
 NLSW-0(PANEL)
 Kazuya Sawada: NLSW-19(7AM-A-1),
 NLSW-47(7PM2-B-4)
 Hiroo Sekiya: NLSW-39(7PM2-A-1)
 Yutaka Shimada: NLSW-19(7AM-A-1),
 NLSW-46(7PM2-B-3),
 NLSW-47(7PM2-B-4),
 NLSW-48(7PM2-B-5),
 NLSW-66(8PM-B-3)
 Shogo Shirafuji: NLSW-6(6AM-B-2)

Aya Shiraama: NLSW-57(8AM-B-4)
 Sho Shirasaka: NLSW-2(6AM-A-2),
 NLSW-35(7PM1-B-2)
 Yoshihiko Susuki: NLSW-20(7AM-A-2)
 Hideyuki Suzuki: NLSW-2(6AM-A-2),
 NLSW-35(7PM1-B-2)
 Shunya Suzuki: NLSW-27(7AM-B-4)
 Eiji Suzuki: NLSW-27(7AM-B-4)
 Tomoya Suzuki: NLSW-52(8AM-A-4),
 NLSW-53(8AM-A-5)
 Kensuke Takada: NLSW-58(8AM-B-5)
 Sho Takagi: NLSW-64(8PM-B-1)
 Shugaku Takahashi: NLSW-45(7PM2-B-2)
 Tetsuya Takahashi: NLSW-57(8AM-B-4),
 NLSW-65(8PM-B-2)
 Kazuki Takahashi: NLSW-67(8PM-B-4)
 Kenji Takamichi: NLSW-20(7AM-A-2)
 Riku Takatou: NLSW-29(7PM1-A-1)
 Kentaro Takeda: NLSW-42(7PM2-A-4)
 Takashi Takekawa: NLSW-67(8PM-B-4)
 Hakaru Tamukoh: NLSW-24(7AM-B-1),
 NLSW-24(7AM-B-1),
 NLSW-34(7PM1-B-1)
 Yuichiro Tanaka: NLSW-34(7PM1-B-1)
 Riku Tanaka: NLSW-52(8AM-A-4),
 NLSW-53(8AM-A-5)
 Katsumi Tateno: NLSW-58(8AM-B-5)
 Yukio Terasaki: NLSW-27(7AM-B-4)
 Kosuke Toda: NLSW-18(6PM-B-5)
 Shigenobu Toda: NLSW-57(8AM-B-4)
 Hideharu Toda: NLSW-63(8PM-A-5)
 Hiroyuki Torikai: NLSW-6(6AM-B-2),
 NLSW-28(7AM-B-5),
 NLSW-42(7PM2-A-4),
 NLSW-43(7PM2-A-5),
 NLSW-49(8AM-A-1),
 NLSW-50(8AM-A-2)
 Yuuki Tsukahara: NLSW-53(8AM-A-5)
 Yota Tsukamoto: NLSW-54(8AM-B-1)
 Honami Tsushima: NLSW-32(7PM1-A-4),
 NLSW-54(8AM-B-1)
 Shota Uchino: NLSW-5(6AM-B-1)
 Takeshi Uematsu: NLSW-39(7PM2-A-1)
 Seiji Uenohara: NLSW-12(6PM-A-4)
 Tetsushi Ueta: NLSW-8(6AM-B-4),
 NLSW-15(6PM-B-2),
 NLSW-16(6PM-B-3),
 NLSW-17(6PM-B-4)
 Ryota Ujifuku: NLSW-43(7PM2-A-5)

Tomokazu Urakawa: [NLSW-45](#)(7PM2-B-2)
Toshimitsu Ushio: [NLSW-18](#)(6PM-B-5)
Naoki Wakamiya: [NLSW-23](#)(7AM-A-5)
Luyan Xu: [NLSW-47](#)(7PM2-B-4)
Mitsuyuki Yamaguchi: [NLSW-0](#)(PANEL)
Hideaki Yamamoto: [NLSW-61](#)(8PM-A-3)
Yoshikazu Yamanaka: [NLSW-33](#)(7PM1-A-5)
Yasunori Yamanouchi: [NLSW-0](#)(PANEL)
Ryo Yamatomi: [NLSW-11](#)(6PM-A-3)
Sota Yasuda: [NLSW-1](#)(6AM-A-1)
Masanao Yasumuro: [NLSW-44](#)(7PM2-B-1)
Yoshihiro Yonemura: [NLSW-37](#)(7PM1-B-4)
Ryouhei Yoshida: [NLSW-52](#)(8AM-A-4)
Yu Yoshino: [NLSW-38](#)(7PM1-B-5)
Daisaburo Yoshioka: [NLSW-21](#)(7AM-A-3)
Wenqi Zhu: [NLSW-39](#)(7PM2-A-1)