

Proceedings of  
the 2022 International Symposium on  
Nonlinear Theory and its Applications (NOLTA2022)



Virtual online conference,  
December 12–15, 2022.

Proceedings of NOLTA2022  
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# **2022 International Symposium on Nonlinear Theory and its Applications**

Virtual online conference  
December 12–15, 2022

**Organizer:**  
NOLTA Society, IEICE



**In Cooperation with:**  
Technical Group on Nonlinear Problems, IEICE  
Technical Group on Complex Communication Sciences, IEICE

**Supported by:**  
Support Center for Advanced Telecommunications Technology Research, Foundation (SCAT)

## Welcome Message from the General Co-Chairs

Dear Colleagues,

We sincerely welcome all of you with our great honor to the 2022 International Symposium on Nonlinear Theory and Its Applications (NOLTA2022). The NOLTA2022 is organized by the NOLTA Society, IEICE, as its flagship symposium in cooperation with the Technical Committee on Nonlinear Problems, IEICE, and the Technical Committee on Complex Communication Science, IEICE.

Many excellent papers were submitted, so that we have a variety of high quality presentations in the regular and special sessions. Furthermore, three remarkable professors from U.S.A., Sweden, and Japan will give their exciting plenary talks. We surely believe that the NOLTA2022 will provide a rich opportunity for researchers, especially students, to exchange their latest, precious, and valuable ideas over the Internet.

The authors of the presented papers in the NOLTA2022 have privilege to submit the full versions of their papers to the Special Section on Recent Progress in Nonlinear Theory and Its Applications in the international journal, NOLTA, IEICE, which will be issued on April 1, 2023. In addition, the Student Paper Award will be given to the excellent student presentations during the symposium to encourage young researchers.

Finally, we would like to thank all organizing committee members for their efforts and cooperation. We also thank all the participants of the NOLTA2022 for their contributions. We hope participants will attend multiple sessions taking advantage of full online format, and enjoy the NOLTA2022.



A handwritten signature in black ink, appearing to read 'Igor Mezić'.

Igor Mezić  
UC Santa Barbara, U.S.A.



A handwritten signature in black ink, appearing to read 'Yoshihiko Horio'.

Yoshihiko Horio  
Tohoku University, Japan  
General Co-Chairs, NOLTA 2022

## Technical Program Co-Chairs' Message

On behalf of the Technical Program Committee, we would like to welcome you to the 2022 International Symposium on Nonlinear Theory and Its Applications (NOLTA 2022). Although we hoped to meet in the coastal resort of Opatija, Croatia, the world's events have again prevented us from doing so; therefore, we are holding NOLTA 2022 as a virtual online conference on December 12-15, 2022.

We are grateful for the volume and quality of papers submitted to the technical program of the conference. This year's meeting has 52 oral sessions in which a total of 206 papers will be presented. Of that number, 163 papers are classified according to 17 topics presented in 41 special sessions. The remaining 43 papers will be presented in 11 regular sessions. A substantial number of presenters have chosen to submit the extended version of their contributions to the Special Section of the open-access journal "Nonlinear Theory and Applications (NOLTA) IEICE" related to this year's NOLTA symposium, to be published in the April 2023 issue.

A particular thank you goes to this year's plenary speakers, Prof. Predrag Cvitanović (Georgia Institute of Technology, USA), Prof. Johan Åkerman (University of Gothenburg, Sweden), and Prof. Takashi Hikihara (Kyoto University, Japan), who will be speaking respectively on Dec 12, 13, and 14.

We are especially thankful to the organizers of the special sessions for selecting the topics and inviting contributors to the symposium. Our deepest gratitude goes to the Technical Program Committee, all the Editors of special section of NOLTA, IEICE, and the reviewers who made sure that the technical program adheres to highest academic standards. Thank you also to all the support staff involved in the organization of the symposium that made sure everything falls in its place.

We hope that the participants will enjoy the technical program at NOLTA 2022 and that it will lead to new connections, ideas, and future development of the field of nonlinear theory and its applications.



*Marko Budišić*  
Marko Budišić  
Clarkson University,  
U.S.A.



*Shigeki Shiokawa*  
Shigeki Shiokawa  
Kanagawa Institute  
Technology, Japan  
Technical Program Co-Chairs, NOLTA 2022



*中尾 裕也*  
Hiroya Nakao  
Tokyo Institute of  
Technology, Japan

## **Note from the Organizing Committee**

The NOLTA2022 was originally planned to be held in the town of Opatija, Croatia, which is a beautiful scenic historic resort facing the Mediterranean Sea. Unfortunately, due to the hard-to-vanish COVID-19 pandemic and the military conflict in Europe, the Officers of the NOLTA Society decided that the NOLTA2022 was moved to online.

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**A2L-B** Complex Systems, Complex Networks and Bigdata Analyses I

**A3L-B** Complex Systems, Complex Networks and Bigdata Analyses II

**Organizer** Atsushi Tanaka (Yamagata University)

**A2L-C** Synergetic Behavior in Complex Networks

**Organizer** Jian Gao (Beijing University)

**A2L-D** Nonlinear Dynamics of Neuromorphic Computing and Hardware Implementation I

**A3L-D** Nonlinear Dynamics of Neuromorphic Computing and Hardware Implementation II

**A4L-D** Nonlinear Dynamics of Neuromorphic Computing and Hardware Implementation III

**A5L-D** Nonlinear Dynamics of Neuromorphic Computing and Hardware Implementation IV

**Organizers** Shigeo Sato (Tohoku University) and Hideyuki Suzuki (Osaka University)

**A3L-C** Laser Dynamics and Complex Photonics I

**A4L-C** Laser Dynamics and Complex Photonics II

**A5L-C** Laser Dynamics and Complex Photonics III

**B1L-C** Laser Dynamics and Complex Photonics IV

**B2L-C** Laser Dynamics and Complex Photonics V

**B3L-C** Laser Dynamics and Complex Photonics VI

**B4L-C** Laser Dynamics and Complex Photonics VII

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

**A4L-B** Recent Advances in the Koopman Operator Framework - Theory, Numerics, and Applications I

**A5L-B** Recent Advances in the Koopman Operator Framework - Theory, Numerics, and Applications II

**A6L-B** Recent Advances in the Koopman Operator Framework - Theory, Numerics, and Applications III

**B1L-B** Recent Advances in the Koopman Operator Framework - Theory, Numerics, and Applications IV

**Organizers** Milan Korda (LAAS-CNRS) and Alexandre Mauroy (University of Namur)

**A6L-D** Geometric Mechanics, Optimization and Control in Applications I

**B1L-D** Geometric Mechanics, Optimization and Control in Applications II

**Organizer** Vakhtang Putkaradze (University of Alberta)

**B2L-B** Cellular Dynamical Systems I

**B3L-B** Cellular Dynamical Systems II

**B4L-B** Cellular Dynamical Systems III

**Organizer** Hiroyuki Torikai (Hosei University)

**B3L-D** Fundamentals and Applications of Complex Communication Science (CCS) I

**B4L-D** Fundamentals and Applications of Complex Communication Science (CCS) II

**Organizers** Megumi Akai-Kasaya (Hokkaido University) and Kosuke Sanada (Mie University)

**C2L-B** Power Processing and Its Applications

**Organizers** Ryo Takahashi (Kyoto University of Advanced Science), Shiu Mochiyama (Kyoto University), and Alberto Castellazzi (Kyoto University of Advanced Science)

**C2L-C** Novel Perspectives of Quantum Walks for Information and Communications Applications

**Organizers** Makoto Naruse (University of Tokyo) and Etsuo Segawa (Yokohama National University)

**C2L-D** Modeling and Control of Cyber-Physical Systems

**Organizer** Hikaru Hoshino (University of Hyogo) and T. John Koo (Hong Kong Applied Science and Technology Research Institute)

**C3L-B** Taming Chaos in Diverse Physical Systems

**Organizer** Yueheng Lan (Beijing University of Posts and Telecommunications)

**C3L-C** Optimization Algorithms with Nonlinear Dynamics I

**C4L-C** Optimization Algorithms with Nonlinear Dynamics II

**Organizers** Tomoyuki Sasaki (Shonan Institute of Technology) and Yoshikazu Yamanaka (Utsunomiya University)

**C3L-D** Nonlinear Circuits and Networks with a Variety of Couplings and Network Topologies I

**C4L-D** Nonlinear Circuits and Networks with a Variety of Couplings and Network Topologies II

**Organizers** Yoko Uwate (Tokushima University), Tadashi Tsubone (Nagaoka University of Technology), and Keiji Konishi (Osaka Metropolitan University)

**C4L-B** Nonlinear Vibrations, Waves, and Localizations I

**C5L-B** Nonlinear Vibrations, Waves, and Localizations II

**D1L-B** Nonlinear Vibrations, Waves, and Localizations III

**D2L-B** Nonlinear Vibrations, Waves, and Localizations IV

**Organizers** Yusuke Doi (Osaka University) and Masayuki Kimura (Setsunan University)

**D1L-C** Algorithms for Dynamical/Static Nonlinear Networks I

**D2L-C** Algorithms for Dynamical/Static Nonlinear Networks II

**Organizer** Yuichi Tanji (Kagawa University)

**D1L-D** Koopman Operator Approach to Power System Nonlinear Dynamics I

**D2L-D** Koopman Operator Approach to Power System Nonlinear Dynamics II

**Organizers** Marcos Netto (National Renewable Energy Laboratory) and Yoshihiko Susuki (Kyoto University)

# Session at a Glance

December 12, 2022 (Monday)

9:00–9:20	Opening ceremony Place: Room A			
9:20–10:20	A1L-A (P1) Plenary Talk 1, Prof. Predrag Cvitanović (Georgia Institute of Technology) Chair: Igor Mezić (UC Santa Barbara) Place: Room A			
	Room B	Room C	Room D	Room E
10:40–12:00	A2L-B (S3-1) Complex Systems, Complex Networks and Bigdata Analyses I Chair: Atsushi Tanaka Page <a href="#">xix</a>	A2L-C (S16) Synergetic Behavior in Complex Networks Chair: Jian Gao Page <a href="#">xix</a>	A2L-D (S10-1) Nonlinear Dynamics of Neuromorphic Computing and Hardware Implementation I Chair: Hideyuki Suzuki Page <a href="#">xx</a>	A2L-E (R1 and 4-1) Nonlinear Phenom- ena/Complex Networks and Systems I Chair: Shiu Mochiyama Page <a href="#">xxi</a>
12:00–13:00	Lunch break			
13:00–14:20	A3L-B (S3-2) Complex Systems, Complex Networks and Bigdata Analyses II Chair: Atsushi Tanaka Page <a href="#">xxi</a>	A3L-C (S7-1) Laser Dynamics and Complex Photonics I Chair: Fumiyo Kuwashima Page <a href="#">xxii</a>	A3L-D (S10-2) Nonlinear Dynamics of Neuromorphic Computing and Hardware Implementation II Chair: Hideyuki Suzuki Page <a href="#">xxii</a>	A3L-E (R1 and 4-2) Nonlinear Phenom- ena/Complex Networks and Systems II Chair: Yuu Miino Page <a href="#">xxiii</a>
14:40–16:00	A4L-B (S15-1) Recent Advances in the Koopman Operator Framework - Theory, Numerics, and Applications I Chairs: Milan Korda and Alexandre Mauroy Page <a href="#">xxiii</a>	A4L-C (S7-2) Laser Dynamics and Complex Photonics II Chair: Kazutaka Kanno Page <a href="#">xxiv</a>	A4L-D (S10-3) Nonlinear Dynamics of Neuromorphic Computing and Hardware Implementation III Chair: Shigeo Sato Page <a href="#">xxiv</a>	A4L-E (R1 and 4-3) Nonlinear Phenom- ena/Complex Networks and Systems III Chair: Ryo Takahashi Page <a href="#">xxv</a>

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**December 12, 2022 (Monday)**

	Room B	Room C	Room D	Room E
16:20– 17:40	A5L-B (S15-2) Recent Advances in the Koopman Operator Framework - Theory, Numerics, and Applications II Chairs: Milan Korda and Alexandre Mauroy Page <a href="#">xxv</a>	A5L-C (S7-3) Laser Dynamics and Complex Photonics III Chair: Sheng-Kwang Hwang Page <a href="#">xxvi</a>	A5L-D (S10-4) Nonlinear Dynamics of Neuromorphic Computing and Hardware Implementation IV Chair: Shigeo Sato Page <a href="#">xxvi</a>	A5L-E (R1 and 4-4) Nonlinear Phenom- ena/Complex Networks and Systems IV Chair: Yuu Miino Page <a href="#">xxvii</a>
18:00– 19:20	A6L-B (S15-3) Recent Advances in the Koopman Operator Framework - Theory, Numerics, and Applications III Chairs: Alexandre Mauroy and Milan Korda Page <a href="#">xxviii</a>		A6L-D (S5-1) Geometric Mechanics, Optimization and Control in Applications I Chair: Vakhtang Putkaradze Page <a href="#">xxviii</a>	

## December 13, 2022 (Tuesday)

	Room B	Room C	Room D	Room E
9:00–10:20	B1L-B (S15-4) Recent Advances in the Koopman Operator Framework - Theory, Numerics, and Applications IV Chairs: Alexandre Mauroy and Milan Korda Page <a href="#">xxviii</a>	B1L-C (S7-4) Laser Dynamics and Complex Photonics IV Chair: Satoshi Sunada Page <a href="#">xxix</a>	B1L-D (S5-2) Geometric Mechanics, Optimization and Control in Applications II Chair: Vakhtang Putkaradze Page <a href="#">xxx</a>	B1L-E (R2-1) Computational Intelligence I Chair: Yuichi Yokoi Page <a href="#">xxx</a>
10:40–12:00	B2L-B (S2-1) Cellular Dynamical Systems I Chair: Hiroyuki Torikai Page <a href="#">xxxi</a>	B2L-C (S7-5) Laser Dynamics and Complex Photonics V Chair: Atsushi Uchida Page <a href="#">xxxii</a>		B2L-E (R2-2) Computational Intelligence II Chair: Yuichi Tanji Page <a href="#">xxxii</a>
12:00–13:00	Lunch break			
13:00–14:40	B3L-B (S2-2) Cellular Dynamical Systems II Chair: Hiroyuki Torikai Page <a href="#">xxxii</a>	B3L-C (S7-6) Laser Dynamics and Complex Photonics VI Chair: Takatomo Mihana Page <a href="#">xxxiii</a>	B3L-D (S4-1) Fundamentals and Applications of Complex Communication Science (CCS) I Chair: Megumi Akai-Kasaya Page <a href="#">xxxiii</a>	B3L-E (R2-3) Computational Intelligence III Chair: Hikaru Hoshino Page <a href="#">xxxiv</a>
15:00–16:40	B4L-B (S2-3) Cellular Dynamical Systems III Chair: Hiroyuki Torikai Page <a href="#">xxxv</a>	B4L-C (S7-7) Laser Dynamics and Complex Photonics VII Chair: Sze-Chun Chan Page <a href="#">xxxv</a>	B4L-D (S4-2) Fundamentals and Applications of Complex Communication Science (CCS) II Chair: Kosuke Sanada Page <a href="#">xxxvi</a>	B4L-E (R2-4) Computational Intelligence IV Chair: Shiu Mochiyama Page <a href="#">xxxvii</a>
17:00–18:00	B5L-A Plenary Talk 2, Prof. Johan Åkermana (University of Gothenburg) Chair: Yoshihiko Horio (Tohoku University) Place: Room A			



## December 14, 2022 (Wednesday)

9:00–10:00	C1L-A Plenary Talk 3, Prof. Takashi Hikihara (Kyoto University) Chair: Igor Mezić (UC Santa Barbara) Place: Room A			
	Room B	Room C	Room D	Room E
10:20–12:00	C2L-B (S14) Power Processing and Its Applications Chair: Ryo Takahashi Page <a href="#">xxxvii</a>	C2L-C (S12) Novel Perspectives of Quantum Walks for Information and Communications Applications Chair: Makoto Naruse Page <a href="#">xxxviii</a>	C2L-D (S8) Modeling and Control of Cyber-Physical Systems Chair: Hikaru Hoshino Page <a href="#">xxxix</a>	
12:00–13:00	Lunch break			
13:00–14:20	C3L-B (S17) Taming Chaos in Diverse Physical Systems Chair: Yueheng Lan Page <a href="#">xxxix</a>	C3L-C (S13-1) Optimization Algorithms with Nonlinear Dynamics I Chair: Tomoyuki Sasaki Page <a href="#">xl</a>	C3L-D (S9-1) Nonlinear Circuits and Networks with a Variety of Couplings and Network Topologies I Chair: Yoko Uwate Page <a href="#">xl</a>	C3L-E (R3-1) Engineering Applications I Chair: Hikaru Hoshino Page <a href="#">xli</a>
14:40–16:00	C4L-B (S11-1) Nonlinear Vibrations, Waves, and Localizations I Chair: Yusuke Doi Page <a href="#">xli</a>	C4L-C (S13-2) Optimization Algorithms with Nonlinear Dynamics II Chair: Yoshikazu Yamanaka Page <a href="#">xlii</a>	C4L-D (S9-2) Nonlinear Circuits and Networks with a Variety of Couplings and Network Topologies II Chair: Tadashi Tsubone Page <a href="#">xlii</a>	C4L-E (R3-2) Engineering Applications II Chair: Yoshiaki Sugitani Page <a href="#">xliii</a>
16:20–18:00	C5L-B (S11-2) Nonlinear Vibrations, Waves, and Localizations II Chair: Yusuke Doi Page <a href="#">xliiii</a>			C5L-E (R3-3) Engineering Applications III Chair: Yoshiaki Sugitani Page <a href="#">xliv</a>

## December 15, 2022 (Thursday)

	Room B	Room C	Room D	Room E
9:00–10:20	D1L-B (S11-3) Nonlinear Vibrations, Waves, and Localizations III Chair: Masayuki Kimura Page <a href="#">xliv</a>	D1L-C (S1-1) Algorithms for Dynamical/Statical Nonlinear Networks I Chair: Yuichi Tanji Page <a href="#">xlv</a>	D1L-D (S6-1) Koopman Operator Approach to Power System Nonlinear Dynamics I Chair: Marcos Netto Page <a href="#">xlv</a>	
10:40–12:00	D2L-B (S11-4) Nonlinear Vibrations, Waves, and Localizations IV Chair: Masayuki Kimura Page <a href="#">xlvi</a>	D2L-C (S1-2) Algorithms for Dynamical/Statical Nonlinear Networks II Chair: Yuichi Tanji Page <a href="#">xlvi</a>	D2L-D (S6-2) Koopman Operator Approach to Power System Nonlinear Dynamics II Chair: Marcos Netto Page <a href="#">xlvii</a>	
12:00–13:00	Closing Ceremony Place: Room A			

# Technical Program

## A1L-A (P1) Plenary Talk

DATE: 2022/12/12 09:20–10:20

PLACE: Room A

Chair: Igor Mezić (UC Santa Barbara)

**A1L-A1** **Exact Coherent Structures and Dynamics of Turbulent Flows**

Predrag Cvitanović (Georgia Institute of Technology)

## A2L-B (S3-1) Complex Systems, Complex Networks and Bigdata Analyses I

DATE: 2022/12/12 10:40–12:00

PLACE: Room B

Chair: Atsushi Tanaka (Yamagata University)

**A2L-B1** **Which Are More Probable Research Collaborators? Organizational or Disciplinary Neighbors** 1

Tetsuo Imai (Hiroshima City University), Yuta Ohkubo (Hiroshima City University)

**A2L-B2** **Implementation of Secure and Fast Pseudo-Random-Number Generator on GPU** 5

Hitoaki Yoshida (Iwate University), Takeshi Murakami (Iwate University)

**A2L-B3** **Spatial Monte Carlo Integration for Learning Restricted Boltzmann Machines** 9

Kaiji Sekimoto (Yamagata University), Muneki Yasuda (Yamagata University)

**A2L-B4** **Multidimensional Data Analysis of Sleep State at Hot Spa in Onogawa Onsen** 13

Tomochika Harada (Yamagata University), Michio Yokoyama (Yamagata University), Morimasa Kato (Yamagata Prefectural Yonezawa University of Nutrition Sciences)

## A2L-C (S16) Synergetic Behavior in Complex Networks

DATE: 2022/12/12 10:40–12:00

PLACE: Room C

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- A2L-C2 Impact of Network Motifs on Response Dynamics** 18  
Peng Ji (Fudan University)
- A2L-C3 Complexity Based Approach for El Niño Magnitude Forecasting Before the “ Spring Predictability Barrier ”** 19  
Jun Meng (Beijing University of Posts and Telecommunications / Potsdam Institute for Climate Impact Research), Jingfang Fan (Potsdam Institute for Climate Impact Research), Josef Ludescher (Potsdam Institute for Climate Impact Research), Agarwal Ankit (Potsdam Institute for Climate Impact Research), Xiaosong Chen (Beijing Normal University), Armin Bunde (Justus-Liebig-Universität Giessen), Jürgen Kurths (Potsdam Institute for Climate Impact Research / Humboldt University), Hans Joachim Schellnhuber (Potsdam Institute for Climate Impact Research)
- A2L-C4 Cascading Formation of Synchronous Clusters of Coupled Second-Order Kuramoto Oscillators** 20  
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DATE: 2022/12/12 10:40–12:00

PLACE: Room D

Chair: Hideyuki Suzuki (Osaka University)

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- A2L-D3 Learning Generic Systems Using Neural Symplectic Forms** 29  
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- A2L-D4 Herding with Self-Organizing Multiple Starting Point Optimization** 33  
Hiroshi Yamashita (University of Tokyo), Hideyuki Suzuki (Osaka University), Kazuyuki Aihara (International Research Center for Neuro intelligence, University of Tokyo)

# A2L-E (R1 and 4-1) Nonlinear Phenomena/Complex Networks and Systems I

DATE: 2022/12/12 10:40–12:00

PLACE: Room E

Chair: Shiu Mochiyama (Kyoto University)

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DATE: 2022/12/12 13:00–14:20

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DATE: 2022/12/12 13:00–14:20

PLACE: Room C

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DATE: 2022/12/12 13:00–14:20

PLACE: Room D

Chair: Hideyuki Suzuki (Osaka University)

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# A3L-E (R1 and 4-2) Nonlinear Phenomena/Complex Networks and Systems II

DATE: 2022/12/12 13:00–14:20

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DATE: 2022/12/12 14:40–16:00

PLACE: Room B

Chairs: Milan Korda (LAAS-CNRS) and Alexandre Mauroy (University of Namur)

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DATE: 2022/12/12 14:40–16:00

PLACE: Room C

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- A4L-C2** **Ultra-Long-Distance Synchronization of DFB Lasers Induced by Common Digital-Phase Modulation CW Light** 122  
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DATE: 2022/12/12 14:40–16:00

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## **A4L-E (R1 and 4-3) Nonlinear Phenomena/Complex Networks and Systems III**

DATE: 2022/12/12 14:40–16:00

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## **A5L-B (S15-2) Recent Advances in the Koopman Operator Framework - Theory, Numerics, and Applications II**

DATE: 2022/12/12 16:20–17:40

PLACE: Room B

Chairs: Milan Korda (LAAS-CNRS) and Alexandre Mauroy (University of Namur)

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- A5L-B4 Numerical Aspects of the Koopman Operator Framework for Computational Analysis of Nonlinear Dynamical Systems** 162  
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Chair: Sheng-Kwang Hwang (National Cheng Kung University)

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- A5L-C2 High Stability of Optical Beats in Laser Chaos** 165

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## **A5L-D (S10-4) Nonlinear Dynamics of Neuromorphic Computing and Hardware Implementation IV**

DATE: 2022/12/12 16:20–17:40

PLACE: Room D

Chair: Shigeo Sato (Tohoku University)

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## **A5L-E (R1 and 4-4) Nonlinear Phenomena/Complex Networks and Systems IV**

DATE: 2022/12/12 16:20–17:40

PLACE: Room E

Chair: Yuu Miino (Naruto University of Education)

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**A5L-E2 An Application Software for Bifurcation Point Detection of Dynamical Systems with Nested-Layer Particle Swarm Optimization** 184

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## **A6L-B (S15-3) Recent Advances in the Koopman Operator Framework - Theory, Numerics, and Applications III**

DATE: 2022/12/12 18:00–19:20

PLACE: Room B

Chairs: Alexandre Mauroy (University of Namur) and Milan Korda (LAAS-CNRS)

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- A6L-B2 Koopman Operator with Control Input** 197  
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- A6L-B3 Finite Data Error Bounds for Koopman Based Prediction and Control Including Bayesian Online Updates** 198  
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## **A6L-D (S5-1) Geometric Mechanics, Optimization and Control in Applications I**

DATE: 2022/12/12 18:00–19:20

PLACE: Room D

Chair: Vakhtang Putkaradze (University of Alberta)

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- A6L-D2 A Structure-Preserving Finite Element Method for MHD That Preserves Energy, Cross-Helicity, Magnetic Helicity,  $\text{div}B = 0$**  206  
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## **B1L-B (S15-4) Recent Advances in the Koopman Operator Framework - Theory, Numerics, and Applications IV**

DATE: 2022/12/13 09:00–10:20

PLACE: Room B

Chairs: Alexandre Mauroy (University of Namur) and Milan Korda (LAAS-CNRS)

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- B1L-B2 Koopman Operators and Inverse Problems** 212  
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## **B1L-C (S7-4) Laser Dynamics and Complex Photonics IV**

DATE: 2022/12/13 09:00–10:20

PLACE: Room C

Chair: Satoshi Sunada (Kanazawa University)

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- B1L-C3 Photonic Reservoir Computing for Prediction and Replication of Chaotic Dynamical Systems** 225  
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DATE: 2022/12/13 09:00–10:20

PLACE: Room D

Chair: Vakhtang Putkaradze (University of Alberta)

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- B1L-D3** **Variational Accelerated Optimization on Riemannian Manifolds** 240  
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- B1L-D4** **Tracing Trajectories in Figure Skating** 242  
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## B1L-E (R2-1) Computational Intelligence I

DATE: 2022/12/13 09:00–10:20

PLACE: Room E

Chair: Yuichi Yokoi (Nagasaki University)

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- B1L-E3** **Investigation of the Influence of Datasets on Image Generation Using Sentence-BERT** 252  
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- B1L-E4** **Feature of Latent Variables in Rotational Transformation of Face Images by U-Net** 256  
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## B2L-B (S2-1) Cellular Dynamical Systems I

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- B2L-B2** **Comparizon Between Spatiotemporally Discrete LCR Circuit Model and a Quantum Counterpart** 264  
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- B2L-B3** **Application of Elementary Cellular Automata to Music Synthesis** 268  
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- B2L-B4** **Analysis of Various Periodic Orbits in Coupled Digital Maps** 271  
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## B2L-C (S7-5) Laser Dynamics and Complex Photonics V

DATE: 2022/12/13 10:40–12:00

PLACE: Room C

Chair: Atsushi Uchida (Saitama University)

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Chair: Hiroyuki Torikai (Hosei University)

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**B4L-E2** **Evaluation of Temperature-Control-Free Replica-Replica-Interactive Simulated Annealing Using 100 Max-Cut Problems** 424

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PLACE: Room A

Chair: Yoshihiko Horio (Tohoku University)

**B5L-A1** **Spin Hall Nano-Oscillator Based Ising Machines for Combinatorial Optimization**

Johan Åkerman (University of Gothenburg)

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DATE: 2022/12/14 09:00–10:00

PLACE: Room A

Chair: Igor Mezić (UC Santa Barbara)

**C1L-A1** **Phenomena and Boundary in Nonlinear Dynamical System (Tentative)**

Takashi Hikihara (Kyoto University)

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DATE: 2022/12/14 10:20–12:00

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Chair: Ryo Takahashi (Kyoto University of Advanced Science)

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Chair: Makoto Naruse (University of Tokyo)

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DATE: 2022/12/14 10:20–12:00

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Chair: Hikaru Hoshino (University of Hyogo)

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PLACE: Room D

Chair: Yoko Uwate (Tokushima University)

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DATE: 2022/12/14 16:20–18:00

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