



 NSC 2024

# 2024 INTERNATIONAL CONFERENCE ON NONLINEAR SCIENCE AND COMPLEXITY

## CONFERENCE MANUAL

 NSC 2024

August 5-10, 2024, Yibin, Sichuan, China

# CONFERENCE MANUAL

# CATALOG

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# 01 ABOUT NSC 2024

This conference will provide a place to exchange recent developments, discoveries, and progress on Nonlinear Dynamics and Complexity. The aims of the conference are to present the fundamental and frontier theories and techniques for modern science and technology; to stimulate more research interest for exploration of nonlinear science and complexity; and to directly pass the new knowledge to the young generation, engineers and technologists in the corresponding fields.

The symposium will focus on the recent developments, findings, and progress on fundamental theories and principles, analytical and symbolic approaches, computational techniques in nonlinear physical science and nonlinear mathematics. Topics of interest in Nonlinear Dynamics and Complexity include but not limited to

- Nonlinear classical and fractional differential equations and applications
- Modeling of nonlinear processes in biology, oceanography, and other areas
- Nonlinear dynamics and engineering nonlinearity
- Discontinuous dynamical systems and control
- Synchronization and chaos control
- Neurodynamics and brain dynamics
- Social dynamics and complexity
- Switching systems with impulses
- Data-driven dynamical systems
- Mathematical methods in artificial intelligence

# 02 COMMITTEES

## ◆ Conference Chairs

Dimitri Volchenkov (Texas Tech University, USA)  
 Jiazhong Zhang (Xi'an Jiaotong University, China)  
 Xianguo Tuo (Sichuan University of Science & Engineering, China)

## ◆ Program Chair

Siyuan Xing (California Polytechnic State University, USA)

## ◆ International Technical Committee

Dumitru Baleanu (Cankaya University, Turkey)  
 Mark Edelman (Yeshiva University, USA)  
 Michal Fečkan (Comenius University in Bratislava, Slovakia)  
 Celso Grebogi (University of Aberdeen, UK)  
 Yu Guo (Midwestern State University Texas, USA)  
 Jianzhe Huang (Shanghai Jiaotong University, China)  
 Jürgen Kurths (Humboldt University Berlin, Germany)  
 Nikolay V. Kuznetsov (Saint Petersburg State University, Russia)  
 Xavier Leoncini (Aix-Marseille Université, France)  
 Edson Denis Leonel (São Paulo State University, Rio Claro, Brazil)  
 Jamal-Odyseas Maaita (Aristotle University of Thessaloniki, Greece)  
 Elbert E.N. Macau (Instituto Nacional de Pesquisas Espaciais, Brazil)  
 Vladimir Nekorkin (Novgorod State University, Russia)

Raoul Nigmatullin (Kazan National Research Technical University, Russia)  
 Paweł Olejnik (Lodz University of Technology, Poland)  
 Lev A. Ostrovsky (University of Colorado Boulder, USA)  
 Vakhtang Putkaradze (University of Alberta, Canada)  
 Minvydas Ragulskis (Kaunas University of Technology, Lithuania)  
 Shanmuganathan Rajasekar (Bharathidasan University, India)  
 Miguel A.F. Sanjuan (Universidad Rey Juan Carlos, Spain)  
 Charalampos (Haris) Skokos (University of Cape Town, South Africa)  
 Victor Shrira (Keele University, UK)  
 Michael Small (The University of West Australia, Australia)  
 Yury Stepanyants (University of Southern Queensland, Australia)  
 Jian-Qiao Sun (University of California Merced, USA)  
 Edgardo Ugalde (Universidad Autónoma de San Luis Potosí, Mexico)  
 Luis Vazquez (Universidad Complutense de Madrid, Spain)  
 Dimitri Volchenkov (Texas Tech University, USA)  
 Vitaly Volpert (CNRS, France)  
 Siyuan Xing (California Polytechnic State University-San Luis Obispo, USA)  
 Xingzhong Xiong (Sichuan University of Science & Engineering, China)  
 Jiazhong Zhang (Xian Jiaotong University, China)

### Local Organization Committee

– Chair –

Xingzhong Xiong (Sichuan University of Science & Engineering, China)

– Co-chair –

Shunyong Zhou (Sichuan University of Science & Engineering, China)

– Co-chair –

Ning Hu (Hebei University of Technology, China)

– Secretary –

Chuan Guo (Sichuan University of Science & Engineering, China)  
 Zhongbin Liu (Sichuan University of Science & Engineering, China)  
 Jianbo Yang (Sichuan University of Science & Engineering, China)  
 Tianxiu Lu (Sichuan University of Science & Engineering, China)  
 Lijia Cao (Sichuan University of Science & Engineering, China)  
 Qinyuan Huang (Sichuan University of Science & Engineering, China)  
 Jurong Ding (Sichuan University of Science & Engineering, China)  
 Xiaogang Wang (Sichuan University of Science & Engineering, China)  
 Yong Liu (Sichuan University of Science & Engineering, China)  
 Xiaoqiang Guo (Hebei University of Technology, China)

### Steering Committee

– Chair –

Albert C.J. Luo (Southern Illinois University, Edwardsville, USA)

– Co-chair –

Lev Ostrovsky (University of Colorado Boulder, USA)

Dumitru Baleanu (Cankaya University, Turkey)



Yu Guo (Midwestern State University, USA)  
 Dimitri Volchenkov (Texas Tech University, USA)  
 Miguel AF Sanjuan (Universidad Rey Juan Carlos, Spain)  
 C. Steve Suh (Texas A&M University, USA)  
 Siyuan Xing (California Polytechnic State University, USA)  
 Xingzhong Xiong (Sichuan University of Science & Engineering, China)  
 Jiazhong Zhang (Xi'an Jiaotong University, USA)

### Award Committee

#### – Chair –

Albert C.J. Luo (Southern Illinois University, Edwardsville, USA)

#### – Co-chair –

Lev Ostrovsky (University of Colorado Boulder, USA)  
 Dumitru Baleanu (Cankaya University, Turkey)  
 Dimitri Volchenkov (Texas Tech University, USA)  
 Miguel AF Sanjuan (Universidad Rey Juan Carlos, Spain)  
 C. Steve Suh (Texas A&M University, USA)  
 Jianqiao Sun (University of California, Merced, USA)

## 03 AWARDS

### Nonlinear Science and Complexity Conference Series Awards

*To promote research and development in nonlinear science and engineering fields, Nonlinear Dynamics and Complexity conference series set four awards*

#### Lagrange Award (2008-present)

*For lifetime achievement in Nonlinear Physical Science*

Nail Ibragimov (Sweden), 2008  
 Lev A. Ostrovsky (USA), 2010  
 Valentin Afraimovich (Mexico), 2012  
 Valery I. Klyatskin (Russia), 2014  
 José Roberto Castilho Piqueira (Brazil), 2016  
 Pierre Collet (France), 2018  
 Vladimir Nekorkin (Russia), 2020  
 Paul Clavin (France), 2020  
 James Yorke (USA), 2021  
 Jürgen Kurths (Germany), 2022  
 Leon O. Chua (USA), 2023  
 Celso Grebogi (UK), 2023  
 Edward Ott (USA), 2023  
**Efim Pelinovsky (Russia), 2024**  
**Yoshisuke Ueda (Japan), 2024**

### G.M. Zaslavsky Award (2010-present)

*For breakthrough achievement in Nonlinear Physical Science*

Thomas Solomon (USA), 2010  
 Raoul Nigmatullin (Russia), 2012  
 Sergey Prants (Russia), 2014  
 Mark Edelman (USA), 2016  
 Xavier Leoncini (France), 2018  
 Dimitri Volchenkov (USA), 2020  
 Edgardo Ugalde (Mexico), 2020  
 Jian-Qiao Sun (USA), 2021  
 Yury Stepanyants (Australia), 2022  
 Victor Shrira (UK), 2023  
 Vakhtang Putkaradze (Canada), 2023  
**Anastasios Bountis (Greece), 2024**  
**Linda E. Reichl (USA), 2024**  
**Arkady Pikovsky (Germany), 2024**

### C.S. Hsu Award (2020-present)

*For distinguished scholars in Nonlinear Dynamics and Control*

Miguel A. F. Sanjuán (Spain), 2020  
 C. Steve Suh (USA), 2020  
 Marat Akhmet (Turkey), 2021  
 Michal Fečkan (Slovakia), 2022  
 Oliver Schütze (Mexico), 2022  
 Tassilo Kuepper (Germany), 2023  
 Dumitru Baleanu (Turkey), 2023  
**Guanrong Chen (Hong Kong), 2024**  
**René Lozi (France), 2024**

### V. Afraimovich Award (2020-present)

*For outstanding young scholars in Nonlinear Physical Science*

Vitali Vougalter (Canada), 2020  
 Ivan Ovsyannikov (Germany), 2020  
 Nikolay V. Kuznetsov (Russia), 2021  
 Michael Small (Australia), 2022  
 Edson Denis Leonel (Brazil), 2023  
**Wei Lin (China), 2024**  
**Alexey Slunyaev (Russia), 2024**

# 09 PLENARY/AWARD TALKS

## Plenary Talks

### • **Ring of Synchrony: Exploring the Intricate Dynamics of Rotating Waves in Coupled Oscillator Networks**

#### **Alexander Pisarchik (In-person)**

Isaac-Peral Chair in Computational Systems Biology Center for Biomedical Technology Universidad Politécnica de Madrid, Spain

### • **Transport Barriers in Oceanic Flows**

#### **Sergey Prants (In-person)**

Head of Dept. of Ocean and Atmospheric Physics at Pacific Oceanological Institute of Russian Academy of Sciences, Vladivostok, Russia, Corresponding member of Russian Academy of Sciences

## Lagrange Award Lectures

### • **KdV-like Models in the Physics**

#### **Efim Pelinovsky (Online)**

Institute of Applied Physics, Nizhny Novgorod, Russia  
National Research University – Higher School of Economics, Nizhny Novgorod, Russia  
Corresponding Member of the Russian Academy of Natural Sciences

### • **What Does a State Point in Chaos Phenomenology Imply?**

#### **Yoshisuke Ueda (Online)**

Kyoto University, Japan

## Zaslavsky Award Lectures

### • **Long Range Interactions Enhance Global Stability in 1-D Hamiltonian Lattices**

#### **Anastasios Bountis (In-person)**

University of Patras, Greece  
Corresponding Member of the Academy of Athens

• **Populations of Oscillators as a Complex System Benchmark:  
from Integrability to Disorder**

**Arkady Pikovsky (Online)**

University of Potsdam, Germany

## Afraimovich Award Lectures

• **Machine Learning Techniques Meet Complex Dynamical  
Systems: a Few Recent Advances**

**Wei Lin (In-person)**

Fudan University, China

## C.S. Hsu Award Lectures

• **Chaos in a Finite-Dimensional Linear System with Weak  
Topology**

**Guanrong (Ron) Chen (In-person)**

City University of Hong Kong, Hong Kong  
Member of Academia Europaea and a Fellow of The World Academy  
of Sciences

• **Sea Wave Envelope Solitons and Rogue Waves**

**Alexey Slunyaev (In-person)**

Institute of Applied Physics RAS,  
Nizhny Novgorod, Russia

• **Do Chaotic Dynamical Systems Contribute to the  
Advancement of Science or Are They just a Mathematical  
Curiosity?**

**René Lozi (In-person)**

Laboratory Jean-Alexandre Dieudonné, University Côte d'azur, Nice,  
France

# 05 INVITED TALKS

## Fractional Calculus and AI: Theory and Applications

### Dumitru Baleanu (In-person)

Cankaya University, Turkey

## What Does Nonideal Transportation Mechanisms in MACRO and MEMS Scales Mean? Present, Past, & Future Directions Considering Regular and Irregular Motions

### Jose Balthazar (Online)

Member of Academy of sciences (ACIESP), SP, Brazil  
Universidade Estadual Paulista, Brazil

## Unconventional Stochastic Switching Events in Nonlinear Graphene Resonators

### Pierpaolo Belardinelli (Online)

Polytechnic University of Marche, Italy

## Digital Twin Advanced Control of Industrial Processes Integrating Laser Diagnostics and CFD

### Yoshihiro Deguchi (In-person)

Tokushima University, Japan

## Generalized Fractional Multidimensional Maps

### Mark Edelman (In-person)

Yeshiva University, USA  
Courant Institute, NYU, USA

## Discontinuous Dynamics for Impulsive Differential Systems with the State-dependent Impulses

### Xilin Fu (In-person)

Shandong Normal University, China

## New Insights on the Impact of Ketogenic Diet on Seizure Dynamics from the Next-generation Neural Mass Models

### Igor Franović (Online)

Institute of Physics Belgrade, Serbia

## Recent Achievements in Studying Ecological Networks

### Celso Grebogi (Online)

Member of the World Academy of Sciences  
University of Aberdeen, UK

## Mathematical Modeling, Stochastic Process Systems and Applied Computational Complexity in Precision Medicine: Clinical and Medical Applications with Fractional Calculus, Bloch Torrey PDEs, Hidden Markov and Artificial Intelligence



**Yeliz Karaca (Online)**

University of Massachusetts, USA

**Multi-Scale Stochastic Modelling Framework for Complex Systems****Markus Kirkilionis (Online)**

University of Warwick, UK

**Forecasting Extreme Events Related to Tipping Elements in the Climate System****Jürgen Kurths (Online)**

Member of the Academia Europaea  
Humboldt University Berlin, Germany

**Global Stability Boundary and Hidden Attractors in the Phase-locked Loops Models****Nikolay V. Kuznetsov (In-person)**

Member of Russian Academy of Science  
St.Petersburg State University, Russia

**Unraveling the Mysteries: Exploring a Second-Order Phase Transition in Chaotic Systems****Edson Denis Leonel (In-person)**

São Paulo State University, Rio Claro, Brazil

**Numerical Forecast and Computational Modeling of Nonlinear Mechanical Behavior of Structural Response Induced by Strong Aerodynamic Thermal Environment During Re-entry of Large-scale Spacecraft****Zhihui Li (In-person)**

China Aerodynamics Research and Development Center, China

**Limit Cycles and Homoclinic Networks in 2-dimensional Polynomial Systems****Albert C.J. Luo (In-person)**

Southern Illinois University, Edwardsville, USA

**Phase Synchronization in a Sparse Randomly Connected Networks under the Effects of Poissonian Spike Inputs****Elbert E. N. Macau (In-person)**

Federal University of Sao Paulo – UNIFESP, Sao Paulo, Brazil

**Group Analysis of the Stationary Magnetogasdynamics Equations in Lagrangian Coordinates****Sergey Meleshko (Online)**

Suranaree University of Technology, Thailand

**Complex Firing Behavior and Synchronization Analysis of Heterogeneous Neural Network**

**Fuhong Min (In-person)**

Nanjing Normal University, China

**Dynamical Behavior of Systems with Positive maximal Lyapunov Characteristic Exponent Very Close to Zero**

**Maaita Jamal-Odyseas (Online)**

Aristotle University of Thessaloniki, Greece

**The Application of a Neural Network Based on a Physical Model of Rotational Tribological Contact for Determining Asymmetric Friction Law**

**Pawel Olejnik (Online)**

Lodz University of Technology, Poland

**Damping and Amplification of Turbulence in the Ocean: Theory and Measurements**

**Lev Ostrovsky (Online)**

University of Colorado, Boulder, USA

**Co-authors: Daria Gladskikh**

Institute of Applied Physics of Russian Academy of Sciences, Russia

**Lie-Poisson Neural Networks (LPNets): Data-Based Computing of Hamiltonian Systems with Symmetries**

**Vakhtang Putkaradze (Online)**

University of Alberta, Canada

**Co-authors: Chris Eldre, Francois Gay-Balmaz, and Sophia Huraka**

Sandia National Lab, USA; NTU, Singapore; U Alberta, Canada

**Self-induced Transparency of Weakly Dispersive Nonlinear Waves in Non-uniform Media: The Dispersive Shock Mechanism**

**Victor Shrira (Online)**

Keele University, UK

**Resampling Methods Are Used for Inverse Uncertainty Quantification in Stochastic Systems**

**Carla Pinto (Online)**

Instituto Superior de Engenharia do Porto, Portugal

**Symphony of the Uncertainty in Three Movements**

**Miguel AF Sanjuan (In-person)**

Member of Spanish Royal Academy of Sciences  
Rey Juan Carlos University in Madrid, Spain

**Dynamics of Machine Learning**

**Michael Small (Online)**

| The University of Western Australia, Australia

### **Quantifying Chaos using Lagrangian Descriptors**

**Haris Skokos (In-person)**

University of Cape Town, South Africa

### **Quadratic Differentials in Analysis and Theoretical Physics**

**Alexander Solynin (In-person)**

Texas Tech University, USA

### **Advanced Theory of Solitons, Lumps, and Ripplons in the Cylindrical Kadomtsev–Petviashvili Equation**

**Yury Stepanyants (In-person)**

University of Southern Queensland, Australia

**Co-authors: W. Hu, Q. Guo, and Zh. Zhang**

### **Reduced Order Modeling of Flow Over a Low Reynolds Number Airfoil**

**Pierre E. Sullivan (Online)**

University of Toronto, Canada

### **Neural Network-based Subspace Harmonic Expansion for Obtaining Highly Accurate Periodic Solutions of Nonlinear Dynamic Systems**

**Jianqiao Sun (In-person)**

University of California, Merced, USA

**Co-authors: Zigang Li, Wang Yan, Miao Li**

Xi'an University of Science and Technology

### **An Elementary Approach to Subdiffusion**

**Edgardo Ugalde (Online)**

Instituto de Física – UASLP, Mexico

### **A Panoramic View of Some Fractional Differential Equations: Properties, Applications and New Scenarios**

**Luis Vázquez (Online)**

Complutense University of Madrid, Spain

### **Thermodynamic Analysis of Network Dynamics: Insights from Very Long Walks**

**Dimitri Volchenkov (Online)**

Texas Tech University, USA

### **Data-driven and Deep Learning of Fractional Difference Equations**

**Guo-Cheng Wu (In-person)**

Chongqing University of Posts and Telecommunications, China

### LCSs-based Fine Functional Structures in Unsteady Fluid Flows

**Jiazhong Zhang (In-person)**

Xi'an Jiaotong University, China

### Applied Symbolic Dynamics: from 1D to 2D

**Weimou Zheng (In-person)**

Institute of Theoretical Physics, Chinese Academy of Sciences, China

### Normal Forms and Versal Unfoldings in GLV

**Weinian Zhang (In-person)**

Sichuan University, China

## 06 PROGRAM

NSC2024 Program - **August 5, 2024** (China Time Zone)

8:00 am - 8:30 am

**Opening Ceremony**

8:30 am - 8:45 am

**Group Photo**

8:45 am - 9:45 am (45-min talk + 15-min Q&A)

**C.S. Hsu Award Lecture**

(Session Chair: Miguel AF Sanjuan)

**Do Chaotic Dynamical Systems Contribute to the Advancement of Science or Are They just a Mathematical Curiosity?**

**René Lozi (In-person)**

University Côte d'azur, Nice, France

9:45 am - 10:45 am (45-min talk + 15-min Q&A)

**Plenary talk**

(Session Chair: Dumitru Baleanu)

**Ring of Synchrony: Exploring the Intricate Dynamics of Rotating Waves in Coupled Oscillator Networks**

**Alexander Pisarchik (In-person)**

Universidad Politécnica de Madrid, Spain

10:45 am - 11:00 am

**Tea Break**

11:00 am - 12:00 am (45-min talk + 15-min Q&A)

**Lagrange Award Lecture**

(Session Chair: Albert Luo)

**What Does a State Point in Chaos Phenomenology Imply?**

**Yoshisuke Ueda (Online)**

Kyoto University, Japan

12:00 pm - 13:30 pm

**Lunch**

1:30 pm-3:30 pm

**Track-1 (25-min talk + 5-min Q&A)**

(Session Chair: Mark Edelman)

**Invited talks**

**Global Stability Boundary and Hidden Attractors in the Phase-locked Loops Models**

**Nikolay V. Kuznetsov (In-person)**

St.Petersburg State University, Russia

**Applied Symbolic Dynamics: from 1D to 2D**

**Weimou Zheng (In-person)**

Institute of Theoretical Physics, Chinese Academy of Sciences, China

**Quadratic Differentials in Analysis and Theoretical Physics**

**Alexander Solynin (In-person)**

Texas Tech University, USA

**Normal Forms and Versal Unfoldings in GLV**

**Weinian Zhang (In-person)**

Sichuan University, China

**Track-2 (25-min talk + 5-min Q&A)**

(Session Chair: Elbert E.N. Macau)

**Invited talks**

**Advanced Theory of Solitons, Lumps, and Ripplons in the Cylindrical Kadomtsev–Petviashvili Equation**



**Yury Stepanyants (In-person)**

University of Southern Queensland, Australia

Co-authors: W. Hu, Q. Guo, and Zh. Zhang

**Quantifying Chaos using Lagrangian descriptors****Haris Skokos (In-person)**

University of Cape Town, South Africa

**Limit Cycles and Homoclinic Networks in 2-dimensional Polynomial Systems****Albert Luo (In-person)**

Southern Illinois University, Edwardsville, USA

**Unraveling the Mysteries: Exploring a Second-Order Phase Transition in Chaotic Systems****Edson Denis Leonel (In-person)**

São Paulo State University, Rio Claro, Brazil

3:30 pm - 3:45 pm

**Tea Break**

3:45 pm - 5:45 pm

**Track-1 (25-min talk + 5-min Q&A)**

(Session Chair: Haris Skokos)

**Invited talks****Group Analysis of the Stationary Magnetogasdynamics Equations in Lagrangian Coordinates****Sergey Meleshko (Online)**

Suranaree University of Technology, Thailand

**Multi-Scale Stochastic Modelling Framework for Complex Systems****Markus Kirkilionis**

University of Warwick, UK

**Dynamics of Machine Learning****Michael Small (Online)**

The University of Western Australia, Australia

**Resampling methods are used for inverse uncertainty quantification in stochastic systems****Carla Pinto (Online)**

Instituto Superior de Engenharia do Porto, Portugal

**Track-2 (25-min talk + 5-min Q&A)**

(Session Chair: Alexey Slunyaev)

**Invited talks****Forecasting Extreme Events Related to Tipping Elements in the Climate System****Jürgen Kurths (Online)**

Humboldt University Berlin, Germany

**Recent Achievements in Studying Ecological Networks**

**Celso Grebogi (Online)**

University of Aberdeen, UK

**Self-induced Transparency of Weakly Dispersive Nonlinear Waves in Non-Uniform Media: the Dispersive Shock Mechanism****Victor Shrira (Online)**

Keele University, UK

**New Insights on the Impact of Ketogenic Diet on Seizure Dynamics from the Next-generation Neural Mass Models****Igor Franović (Online)**

Institute of Physics Belgrade, Serbia



6:30 pm - 8:30 pm

**Banquet**NSC2024 Program - **August 6, 2024** (China Time Zone)

8:00 am-10:00 am

**Track-1 (25-min talk + 5-min Q&A)**

(Session Chair: Nikolay V. Kuznetsov)

**Invited talks****Damping and Amplification of Turbulence in the Ocean: Theory and Measurements****Lev Ostrovsky (Online)**

University of Colorado, Boulder, USA

**Co-authors: Daria Gladskikh**

Institute of Applied Physics of Russian Academy of Sciences, Russia

**Lie-Poisson Neural Networks (LPNets): Data-Based Computing of Hamiltonian Systems with Symmetries****Vakhtang Putkaradze (Online)**

University of Alberta, Canada

**Co-authors: Chris Eldre, Francois Gay-Balmaz, and Sophia Huraka**

Sandia National Lab, USA; NTU, Singapore; U Alberta, Canada

**Thermodynamic Analysis of Network Dynamics: Insights from Very Long Walks****Dimitri Volchenkov (Online)**

Texas Tech University, USA

**Fractional Calculus and AI: Theory and Applications**  
**Dumitru Baleanu (In-person)**

Cankaya University, Turkey

### Track-2 (25-min talk + 5-min Q&A)

(Session Chair: René Lozi)

#### Invited talks

##### What Does Nonideal Transportation Mechanisms in MACRO and MEMS Scales Mean?

**Jose Balthazar (Online)**

Universidade Estadual Paulista, Brazil

##### Reduced Order Modeling of Flow Over a Low Reynolds Number Airfoil

**Pierre E. Sullivan (Online)**

University of Toronto, Canada

##### An Elementary Approach to Subdiffusion

**Edgardo Ugalde (Online)**

Instituto de Física – UASLP, Mexico

##### Symphony of the Uncertainty in Three Movements

**Miguel AF Sanjuan (In-person)**

Rey Juan Carlos University in Madrid, Spain

10:00 am-10:15 am

**Tea Break**

10:15 am-11:15 am (45-min talk + 15-min Q&A)

### Plenary talk

(Session Chair: Tassos Bountis)

#### Transport Barriers in Oceanic Flows

**Sergey Prants (In-person)**

Pacific Oceanological Institute of Russian Academy of Sciences, Vladivostok, Russia

11:15 am-12:15 pm (45-min talk + 15-min Q&A)

### C.S. Hsu Award Lecture

(Session Chair: Miguel AF Sanjuan)

#### Chaos in Finite-Dimensional Linear Systems with Weak Topology

**Guanrong Chen (In-person)**

City University of Hong Kong

12:30 pm - 2:00 pm

**Lunch**

2:00 pm - 3:30 pm

### Track-1 (25-min talk + 5-min Q&A)

(Session Chair: Sergey Prants)

## Invited talks

### Data-driven and Deep Learning of Fractional Difference Equations

**Guo-Cheng Wu (In-person)**

Chongqing University of Posts and Telecommunications, China

### Mathematical Modeling, Stochastic Process Systems and Applied Computational Complexity in Precision Medicine: Clinical and Medical Applications with Fractional Calculus, Bloch Torrey PDEs, Hidden Markov and Artificial Intelligence

**Yeliz Karaca**

University of Massachusetts, USA

### Extended Caputo $k$ - type fractional derivative operator

**Praveen Agarwal (In-person)**

Anand International College of Engineering, India

### Track-2 (25-min talk + 5-min Q&A)

(Session Chair: Alexander Pisarchik)

## Invited talks

### LCSs-based Fine Functional Structures in Unsteady Fluid Flows

**Jiazhong Zhang (In-person)**

Xi'an Jiaotong University, China

### Digital Twin Advanced Control of Industrial Processes Integrating Laser Diagnostics and CFD

**Yoshihiro Deguchi (In-person)**

Tokushima University, Japan

### The Application of a Neural Network Based on a Physical Model of Rotational Tribological Contact for Determining Asymmetric Friction Law

**Pawel Olejnik (Online)**

Lodz University of Technology, Poland

3:30 pm - 3:45 pm

Tea break

3:45 pm - 4:45 pm (45-min talk + 15-min Q&A)

## Lagrange Award Lecture

(Session Chair: Sergey Prants)

### KdV-like Models in the Physics

**Efim Pelinovsky (Online)**

National Research University, Higher School of Economics, Nizhny Novgorod, Russia

4:45 pm - 5:45 pm (45-min talk + 15-min Q&A)

## Zaslavsky Award Lecture

(Session Chair: Yury Stepanyants)

**Populations of Oscillators as a Complex System  
Benchmark: from Integrability to Disorder**

**Arkady Pikovsky (Online)**

University of Potsdam, Germany

6: 00 pm - 8:00 pm

**Dinner**

8:00 pm - 9:00 pm

**Panel Discussion: DNC, JAND, JEAM, JVTSD Journals**

NSC2024 Program - **August 7, 2024** (China Time Zone)

8:00 am -9:00 am (45-min talk + 15-min Q&A)

## Zaslavsky Award Lecture

(Session Chair: Mark Edelman)

**The Thermalization of Quantum Systems**

**Linda E. Reichl (Online)**

The University of Texas at Austin, USA

9:00 am-10:00 am (45-min talk + 15-min Q&A)

## Zaslavsky Award Lecture

(Session Chair: Miguel AF Sanjuan)

**Long Range Interactions Enhance Global Stability  
in 1-D Hamiltonian Lattices**

**Tassos Bountis (In-person)**

The University of Texas at Austin, USA

10: 15 am - 11: 15 am (45-min talk + 15-min Q&A)

## Afraimovich Award Lecture

(Session Chair: Dumitru Baleanu)

**Sea Wave Envelope Solitons and Rogue Waves**

**Alexey Slunyaev (In-person)**

Institute of Applied Physics RAS, Nizhny Novgorod,  
Russia



10:00 am - 10:15 am

Tea break

11:15 am - 12:15 pm (45-min talk + 15-min Q&A)

### Afraimovich Award Lecture

(Session Chair: Albert Luo)

**Machine Learning Techniques Meet Complex Dynamical Systems: a Few Recent Advances**

**Wei Lin (In-person)**

Fudan University, China

12:30 pm - 2:00 pm

Lunch

2:00 pm - 4:00 pm

Track-1 (25-min talk + 5-min Q&A)

(Session Chair: Dumitru Baleanu)

### Invited talks

**Generalized Fractional Multidimensional Maps**

**Mark Edelman (In-person)**

Yeshiva University, USA; Courant Institute, NYU, USA

**Phase Synchronization in a Sparse Randomly Connected Networks under the Effects of Poissonian Spike Inputs**

**Elbert E. N. Macau (In-person)**

Federal University of Sao Paulo – UNIFESP, Sao Paulo, Brazil

**Discontinuous Dynamics for Impulsive Differential Systems**

**Xilin Fu (In-person)**

Shandong Normal University, China

**Complex Firing Behavior and Synchronization Analysis of Heterogeneous Neural Network**

**Fuhong Min (In-person)**

Nanjing Normal University, China

Track-2 (25-min talk + 5-min Q&A)

(Session Chair: Albert Luo)

### Invited talks

**Neural Network-based Subspace Harmonic Expansion for Obtaining Highly Accurate Periodic Solutions of Nonlinear Dynamic Systems**

**Jianqiao Sun (In-person)**

University of California, Merced, USA

**Co-authors: Zigang Li, Wang Yan, Miao Li**

Xi'an University of Science and Technology



**Numerical Forecast and Computational Modeling of Nonlinear Mechanical Behavior of Structural Response Induced by Strong Aerodynamic Thermal Environment during Re-entry of Large-scale Spacecraft**

**Zhihui Li (In-person)**

China Aerodynamics Research and Development Center, China

**Dynamical Behavior of Systems with Positive Maximal Lyapunov Characteristic Exponent Very Close to Zero**

**Maaita Jamal-Odyseas (Online)**

Aristotle University of Thessaloniki, Greece

**Unconventional Stochastic Switching Events in Nonlinear Graphene Resonators**

**Pierpaolo Belardinelli (Online)**

Polytechnic University of Marche, Italy



4:00 pm- 5:00 pm

**Award Ceremony**



5:00 pm - 6:00 pm

**City Walk**



6: 00 pm - 8:00 pm

**Dinner**

NSC2024 Program - **August 8, 2024** (China Time Zone)



8:00 am - 9:30 am

**Symposium-2-1 (Track-1)** (15-min talk + 5-min Q&A)

**Complexity Theory, Mathematical Sciences and Applied Complexity Science**

(Session Chair: Yeliz Karaca)

**Hidden Markov Models and Doubly Stochastic Processes: Precision Medicine for Stroke Subtypes Complexity Modeling with the Multifractal Bayesian Method and Non-integer (fractional) Order**

**Yeliz Karaca**

University of Massachusetts (UMass) Chan Medical School, USA

**Co-authors: Dumitru Baleanu, Majaz Moonis**

Lebanese American University, Beirut Lebanon and Institute of Space Sciences Magurele-Bucharest, Romania

**Flexural Gravity Wave Motion Over Multiple Sinusoidal Seabeds**

**Neha Bisht**

Indian Institute of Technology, Kharagpur, India

**Co-authors: Pawan Negi, Trilochan Sahoo**

Indian Institute of Technology, Kharagpur, India

**Computational Image and Text Fusion Modeling for Multimodal Representation**

**Wang Meng**

University of Malaya, Malaysia

**Dynamical Study of a Financial System with the Effect of Financial Information**

**Kaushik Dehingia**

Sonari College, India

**Ferroptosis as a Biological Phase Transition IV: Chronotherapy of Epithelial-mesenchymal Transition of the Tumor Growth**

**Henry Miguel Suarez Ogando**

University of Havana, Cuba

**Co-authors: Alejandro Guerra Gonzalez, Ricardo Mansilla Corona, Jose Manuel Nieto Villar**

Center for Interdisciplinary Research in Sciences and the Humanities (CEIICH), National Autonomous University of Mexico (UNAM), Mexico, Mexico; Peninsular Center for Humanities and Social Sciences (CEPHCIS), National Autonomous University of Mexico (UNAM), Merida, Mexico

**What can the Social Dynamics of Error and Unpredictability bring to Non-Linear Science?**

**Piero Dominici**

University of Perugia, Italy

**Symposium-4-1 (Track-2)** (20-min talk + 5-min Q&A)

**Solitons and Other Localized Structures in Physical and Mathematical Sciences**

(Session Chair: Yury Stepanyants)

**Solutions to the KP Equation via the Zakharov-Manakov Dressing Method**

**Patrik Nabelek**

Oregon State University, USA

**Lumps and Lump Chains in the KP-I Equation**

**Dmitry Zakharov**

Central Michigan University, USA

**Co-authors: Andrey Gelash, Charles Lester, Yuri Stepanyants, Vladimir Zakharov**

**Nonlinear Effects of Ice-water-structure Interaction**

**Yuriy Semenov**

Harbin Engineering University, China

**Co-authors: Baoyu Ni**

Harbin Engineering University, Harbin, China

**Resonant Response of a Floating Viscoelastic Plate due to a Moving Vibrating Load**

**Susam Boral**

Harbin Engineering University, China

**Co-authors: Baoyu Ni, A. A. Korobkin**

Harbin Engineering University, Harbin, China; University of East Anglia, Norwich, UK

**Symposium-5-1 (Track-3)** (20-min talk + 5-min Q&A)

**Geometric methods in mechanics and control**

(Session Chair: Vakhtang Putkaradze)

**Optimal Control and Machine Learning**

**Anthony Bloch**

University of Michigan, USA

**Thermodynamically Consistent Variational Theory of a Breaking Porous Media**

**Vakhtang Putkaradze**

University of Alberta, Canada

**Koopmon Trajectories in Nonadiabatic Quantum-classical Dynamics****Cesare Tronci**

University of Surrey, England

**Co-authors: Werner Bauer, Paul Bergold, François Gay-Balmaz**

University of Surrey, UK; Nanyang Technological University, Singapore

**Jacobian Granger Causality for Causal Inference of Complex Dynamical System****Lock Yue Chew**

Nanyang Technological University, Singapore

**Co-authors: Suryadi, Yew-Soon Ong**

Nanyang Technological University, Singapore

**Symposium-9-1 (Track-4)** (15-min talk + 5-min Q&A)**Nonlinear Dynamics in Fluids and Combustion**

(Session Chair: Jiazhong Zhang)

**Nonlinear Pattern Dynamics in the Tape Peeling Trace****Keisuke Taga**

Waseda University, Japan

**Co-authors: Yoshihiro Yamazaki**

Waseda University, Japan

**Wake-induced Vibration of a Large Number of Circular Cylinders in Tandem Arrangement: A Travelling Wave Response****Xu Sun**

China University of Petroleum-Beijing, China

**Co-authors: Baowen Zhao, Peiyi Han**

China University of Petroleum-Beijing, China

**Research on Particles and Path Length Influence on TDLAS-DAS in Combustion Flow Field****Zhenzhen Wang**

Xi'an Jiaotong University, China

**A Novel Homotopy-based Wavelet Galerkin Method for Solving Nonlinear Initial Boundary Value Problem.****Junfeng Xiao**

Shanghai Maritime University, China

**Co-authors: Qiang Yang; Qiang Yu; Jianqiang Chen**

Shanghai Maritime University, China

**Mesoscale IC Engine Methanol-gasoline Combustion on Yellow Flame Area****Jiawei Pan**

Chang'an University, China

**Co-authors: Yangyang Li**

Chang'an University, China



10:00 am - 5:00 pm

**Free Discussion**

NSC2024 Program - **August 9, 2024** (China Time Zone)

8:00 am - 9:30 am

**Symposium-5-2 (Track-1)** (20-min talk + 5-min Q&A)

**Geometric methods in mechanics and control**  
(Session Chair: Vakhtang Putkaradze)

**Infinite Dimensional Lagrange-Dirac systems with  
Boundary Energy Flow**

**François Gay-Balmaz**

Nanyang Technological University, Singapore

**Co-authors: Hiroaki Yoshimura**

Waseda University, Japan

**Completeness of Riemannian Metrics and  
Applications to Control of Mechanical Systems**

**David Martin de Diego**

ICMAT, Spain

**Co-authors: J.A. Acosta, A. Bolch**

U. Sevilla; University of Michigan, USA

**Nonholonomic Maps**

**Dmitry Zenkov**

North Carolina State University, USA

**Co-authors: Donghua Shi, Shan Gao**

Beijing Institute of Technology, China

**Deep Reinforcement Learning of an Agent-Based  
Bus Transportation Model**

**Andri Pradana**

Nanyang Technological University, Singapore

**Co-authors: Lock Yue Chew**

Nanyang Technological University, Singapore

**Symposium-13-1 (Track-2)** (15-min talk + 5-min Q&A)

**Theory and Applications in Nonlinear Dynamical  
Systems**

(Session Chair: Makrina Agaoglou)

**A Lagrange Interpolation Method With Applications  
To The Finite Element Method For  
Convection-diffusion Problems**

**Pedro Galan** (Invited talk 25 min)

Universidad Politecnica de Madrid, Spain

**Backward Uniqueness Property of Dynamic Systems**

**Mei-Qin Zhan**

University of North Florida, USA

**Three-dimensional Nonlinear Coupling Vibration  
of Drill String in Deepwater Rise**

**Jun Liu**

SouthWest Petroleum University, China

**Co-authors: Yili Chen**

SouthWest Petroleum University, China

**Analytical and Experimental Study of a  
Hindmarsh-Rose Neuron Model**

**Wang Xinya**

Xi 'an Jiaotong University, China

**Co-authors: Xu Yeyin**

Xi 'an Jiaotong University, China



**Symposium-12-1 (Track-3)** (15-min talk + 5-min Q&A)

**Nonlinear Dynamics of Engineering Systems**  
(Session Chair: Siyuan Xing)

**CombOpNet: Towards Scaling SINDy to Hundreds and Thousands of Dimensions**

**Siyuan Xing**

California Polytechnic State University, USA

**Co-authors: Qingyu Han, Efstathios Charalampidis**

California Polytechnic State University, USA

**Quadratic Voltage Response in Piezoelectric Energy Harvesting Using a Tip-Attached beam**

**Bo Yu**

Utah Valley University, USA

**Co-authors: Edoardo Rubino**

San Jose State University, USA

**Radial Basis Function Neural Networks Solution for Stochastic Nonlinear System**

**Xi Wang**

Xi'an Jiaotong University

**Co-authors: Jun Jiang, Ling Hong**

Xi'an Jiaotong University

**Nonlinear Vibrations of Graphene-reinforced Porous Rotating Conical Shell with Arbitrary Boundary Conditions using Traveling Wave Vibration Analysis**

**Han Li**

Beijing University of Technology, China

**Nonlinear Vibrations of Rotating Pretwisted Composite Blade Reinforced by Functionally Graded Graphene Platelets Subjected to Airflow Excitation in Thermal Environment**

**Yueyong Chang**

Beijing University of Technology, China

**Symposium-16-1 (Track-4)** (15-min talk + 5-min Q&A)

**Nonlinear Dynamics and Network Science in Intelligent Systems**

(Session Chair: Bin Wu)

**Research on Liner Port Network Based on Complex Networks**

**Xinyue Bu**

Xi'an University of Posts & Telecommunications, China

**Co-authors: Shengli Cao**

Xi'an University of Posts & Telecommunications, China

**A Review of Applications of Machine Learning in the Dynamics of Propagation in Complex Networks**

**Bin Wu**

Texas A&M University, USA

**Co-authors: C. Steve Suh**

Texas A&M University, USA

**The Role of Susceptible Individuals in Spreading Dynamics**

**Chang Su**

University of Electronic Science and Technology of China, China

**Co-authors: Fang Zhou, Linyuan Lv**

University of Electronic Science and Technology of China, China

**Large-Scale Memristive Rulkov Ring-Star Neural Network with Complex Spatio-Temporal Dynamics**

**Haodong Li**

Nanjing Normal University, China

**Co-authors: Fuhong Min**

Nanjing Normal University, China

**Time-variant Response Computation of Flexible Multibody Systems with Imprecise Random Field Uncertainties**

**Jingwei Meng**

Beijing Institute of Technology, China

**Co-authors: Yanfei Jin**

Beijing Institute of Technology, China

9:30 am -9:45 am

**Tea Break**

9:45 am-11:15 am

**Symposium-1-2 (Track-1)** (15-min talk + 5-min Q&A)

**Nonlinear Dynamics and Complexity**

(Session Chair: Yeyin Xu)

**Acoustic Emission Based Calibration of Gas Safety Valves at Set Pressure**

**Xiang Shi**

Sichuan University of Science & Engineering, China

**Triad Virus Transmission Law**

**Lu Yihang**

Sichuan University of Science & Engineering, China

**Co-authors: Cao Shengli**

Sichuan University of Science & Engineering, China

**Research on Coordinated Control Strategy of Three-terminal DC transmission System**

**Dezhi Kong**

Sichuan University of Science & Engineering, China

**Stochastic Response and P-Bifurcation of Hysteresis Systems Excited by Combined Harmonic and Poisson Excitations**

**Zi Yuan**

Huaqiao University, China

**Co-authors: Lincong Chen, Jian-qiao Sun**

Huaqiao University, China; University of California, Merced, USA

**Model Predictive Control Strategy Based on MMC**

**Yuli Lv**

Sichuan University of Science & Engineering, China

**Symposium-7-1 (Track-2)** (15-min talk + 5-min Q&A)**Discontinuous Dynamical Systems and Control**

(Session Chair: Jianzhe Huang)

**Analysis of Boundary Equilibrium Bifurcation and Hopf-like Bifurcation in a 2 DOF Nonlinear Jeffcott Rotor System****Yidan Wang**

Xi'an Jiaotong University, China

**Co-authors: Jun Jiang, Ling Hong**

Xi'an Jiaotong University, China

**Analytical Bifurcation for the Piecewise Nonlinear Dynamical System with Higher Singularities****Jianzhe Huang**

Shanghai Jiao Tong University, China

**Co-authors: Kai Jiang**

Shanghai Jiao Tong University, China

**Analytical Bifurcation Trees of Periodic Motions in Impact Duffing Oscillator****Yuzhou Zhu**

Southern Illinois University, Edwardsville, USA

**Co-authors: Albert C.J. Luo**

Southern Illinois University, Edwardsville, USA

**Wavelet-based Method for Solving a Polydispersed Fuel Combustion Process under Fluctuating Burning Rates by Considering Diffusion Effect****Yu Lu**

Xi'an Jiaotong University, China

**Co-authors: Jun Jiang, Ling Hong**

Xi'an Jiaotong University, China

**A Novel Image Encryption Method based on 2D-LFHCM and DNA Computing****Yuanlin Chen**

Sichuan University of Science and Engineering, China

**Co-authors: Tianxiu Lu**

Sichuan University of Science and Engineering, China

**Symposium-9-2 (Track-3)** (15-min talk + 5-min Q&A)**Nonlinear Dynamics in Fluids and Combustion**

(Session Chair: JiaZhong Zhang)

**Active Control of Supersonic Underexpanded Plane Jet Noise Guided by Resolvent Analysis****Long-Long Liang**

University of Science and Technology of China, China

**Co-authors: Zhen-Hua Wan**

University of Science and Technology of China, China

**Speed and Ratio Effects on Methanol-Gasoline Flame in Mesoscale ICES****Weiheng Liu**

Chang'an University, China

**Co-authors: Yangyang Li**

Chang'an University, China

### **Nonlinear Energy Sinks in Flow Field**

**Lefan Jia**

Xi'an Jiaotong University, China

**Co-authors: Weikang Shi, Hui Wu, Jiazhong Zhang**

Xi'an Jiaotong University, China

### **Nonlinear Model for 2DOF-VIV of a Near-wall Beam** **Mengmeng Tao**

China University of Petroleum, China

**Co-authors: Xu Sun**

China University of Petroleum, China

### **A Cellular Automata Approach for the Combustion Dynamics of the Composite Solid Propellants with Random Packing Modeling**

**Yi Wang**

Northwestern Polytechnical University, China

**Co-authors: Zhuopu Wang, Kairui Yu, Yi Wang, Shengmeng Lv, Bo Kuang, Yuhui Wang**

Northwestern Polytechnical University, China

**Symposium-14-1 (Track-4)** (15-min talk + 5-min Q&A)

### **Nonlinear Behavior Analyses and Diagnoses of Engineering Problem**

(Session Chair: Liming Dai)

### **Mechanism of Drilling Speed Increase in Ultra-HPHT Oil & Gas Wells**

**Ning Hu**

Hebei University of Technology, China

### **Solving Nonlinear FG Tubular Systems with a Semi-analytical and Numerical Approach**

**Liming Dai**

University of Regina, Canada

**Co-authors: Kamran Foroutan**

University of Regina, Canada

### **Nonlinear Behavior of Mining Risers Induced by Gas-liquid-solid three-phase**

**Xiaoqiang Guo**

Hebei University of Technology, China

### **Nonlinear Behavior of Drill String System Axial-torsional Coupling in Gas Well**

**Xinye Li**

Hebei University of Technology, China

**Co-authors: Mingming Li**

Hebei University of Technology, China

### **Path Planning Based on an Improved Crayfish Optimization Algorithm**

**Sun YuQi**

Sichuan University of Science & Engineering, China



11:30 am - 1:00 pm

**Lunch**

1:15 pm-2:45 pm

**Symposium-1-3 (Track-1)** (15-min talk + 5-min Q&A)

**Nonlinear Dynamics and Complexity**

(Session Chair: Chuan Guo)

**A New Model for Monthly Precipitation Prediction via Deep Learning and Multifractal Detrended Fluctuation Analysis**

**Zeng Hai**

Sichuan University of Science & Engineering, China

**Co-authors: Xie Yunxia, Xiang Tianming**

Sichuan University of Science & Engineering, China

**A Novel 3D Point Cloud Based Method for Tiny Surface Defect Detection**

**Jiaxiong Huang**

Sichuan University of Science & Engineering, China

**A Novel Lightweight YOLOv8-Based Model for Rotor Blade Defect Detection**

**Chen Fan**

Sichuan University of Science & Engineering, China

**Dynamics Analysis of Infectious Diseases Based on SLIR model**

**Tong Xiao**

Sichuan University of Science & Engineering, China

**Co-authors: Cao Shengli**

Sichuan University of Science & Engineering, China

**Research on MPPT Control Algorithm Based on Improved Photovoltaic System**

**Zhao Zheng**

Sichuan University of Science & Engineering, China

**Co-authors: Guojun Ling**

Sichuan University of Science & Engineering, China

**Symposium-4-2 (Track-2)** (20-min talk + 5-min Q&A)

**Solitons and Other Localized Structures in Physical and Mathematical Sciences**

(Session Chair: Yury Stepanyants)

**Windowed Inverse Scattering Transform Applied to Deep-water Surface Waves**

**Alexey Slunyaev**

Institute of Applied Physics RAS, Nizhny Novgorod, Russia

**Effect of Viscosity on the Self-similar Growth of Conic Cusps on the Surface of a Conducting Liquid in an Electric Field**

**Nikolay M. Zubarev**

Institute of Electrophysics, UB RAS, Ekaterinburg, Russia

**Non-integrable Soliton Turbulence within the Schamel Equation**

**Ekaterina Didenkulova**

Mathematics and Computer Science, HSE University, Russia

**Co-authors: Marcelo V. Flamarion, Efim Pelinovsky**

Aeronautics Institute of Technology (ITA), Brazil

**Gardner Equation and Nonlinear Internal Waves in the Shallow Sea**

**Tatiana Talipova**

Institute of Applied Physics, Nizhny Novgorod, Russia

**Co-authors: Oxana Kurkina, Efim Pelinovsky and Ekaterina Didenkulova**

Nizhny Novgorod State Technical University, Nizhny Novgorod, Russia

**Symposium-9-3 (Track-3)** (15-min talk + 5-min Q&A)

**Nonlinear Dynamics in Fluids and Combustion**

(Session Chair: Xu Sun)

**The Influence of Yellow Flame Area in Internal Combustion Engines Based on Inter**

**Jiawei Pan**

Chang'An University, China

**Co-authors: Yangyang Li**

Chang'An University, China

**A Local Deformation Regression for Detecting Lagrangian Coherent Structures**

**Hao Jiang**

Xi'an Jiaotong University, China

**Co-authors: Jiazhong Zhang**

Xi'an Jiaotong University, China

**A Novel Static Mixer for Blending Hydrogen into Natural Gas Pipelines**

**Tao Di**

China University of Petroleum, China

**Co-authors: Xu Sun**

China University of Petroleum, China

**Fluid Transport in Atmospheric Flow Based on Lagrangian Coherent Structures**

**Wei Wang**

Chang'An University, China

**Co-authors: Jiazhong Zhang, Yangyang Li**

Chang'An University, China

**Research on Influence Factors of Leakage Characteristics of Labyrinth Seal**

**Jiabao Lai**

Xi'an Jiaotong University, China

**Co-authors: Zhenzhen Wang, Zideng Wang, Weixiong Chen**

Xi'an Jiaotong University, China

**Symposium-14-2 (Track-4)** (15-min talk + 5-min Q&A)

**Nonlinear Behavior Analyses and Diagnoses of Engineering Problem**

(Session Chair: Xiaoqiang Guo)

**Vibration Prediction Model of Mining Riser Used in Deep-sea Gas Hydrate**

**Yingwei Li**

Hebei University of Technology, China

**A Multi-degree-of-freedom Coupled Vibration Energy Harvester**

**Liwei Zhang**



Hebei University of Technology, China

**Co-authors: Yijian Zhi, Jingyu Zhang, Ning Hu**

Hebei University of Technology, China

**A Novel Energy Harvester for Energy Harvesting Performance Improvement**

**Yijian Zhi**

Hebei University of Technology, China

**Co-authors: Liwei Zhang, Jingyu Zhang**

Hebei University of Technology, China

**Nonlinear Vibrations of Graphene-reinforced Porous Rotating Conical Shell with Arbitrary Boundary Conditions using Traveling Wave Vibration Analysis**

**Han Li**

Hebei University of Technology, China

**Research on Islanding Detection and Operational Switching Control Strategy for Modular Multilevel Converter (MMC) Transmission System**

**Qingya Song**

Sichuan University of Science and Engineering, China

2:45 pm -3:00 pm

**Tea Break**

3:00 - 4:30 pm

**Symposium-3-1 (Track-1)** (15-min talk + 5-min Q&A)

**Fractional Calculus in Complex and Nonlinear Systems**

(Session Chair: Dumitru Baleanu)

**Continual Stabilization of the Unstable Fixed Point of the Fractional Difference Logistic Map**

**Ernestas Uzdila**

Kaunas University of Technology, Lithuania

**Co-authors: Inga Telksniene, Tadas Telksnys, Minvydas Ragulskis**

Kaunas University of Technology, Lithuania

**Qualitative Dynamical Behaviour of System of Hybrid Fractional Pantograph  $q$ -differential Equations with Nonlinear  $p$ -Laplacian Operator**

**Mohammad Esmael Samei**

Bu-Ali Sina University, Iran

**Stabilizing the Predator-Prey Ecosystems: A Fractional-Order Mathematical Model**

**Zeeshan Ali**

Monash University Malaysia, Malaysia

**Design of Levenberg-Marquardt and Bayesian Regularization Neural Networks for Solving the Third-order Nonlinear Multi-singular Emden-Fowler Equations**

**Imtiaz Khan**

Abdul Wali Khan University Mardan KPK Pakistan

**Co-authors: Saeed Islam**

Abdul Wali Khan University Mardan KPK Pakistan

**A Fractional Order HP Memristive System with a Line of Equilibria, its Bifurcation Analysis, Circuit Simulation and ARM-FPGA-based Implementation**

**Tantoh Bitomo Francis Richard**

University Of Yaounde I, Cameroon

**Co-authors: Kammogne Soup Tewa Alain**

University of Dschang, Cameroon

**Symposium-4-3 (Track-2)** (20-min talk + 5-min Q&A)

**Solitons and Other Localized Structures in Physical and Mathematical Sciences**

(Session Chair: Yury Stepanyants)

**Multidimensional Riemannian Spaces and Their Applications for Integration of Navier-Stokes Equations**

**Valerii Dryuma**

Moldova State University, Moldova

**Two-dimensional Nonlinearity Managed Vector Solitons**

**Fatkhulla AbdullaevM.Ogren**

**Co-authors: J.Yuldashev**

Physical-technical institute of Uzbekistan Academy of Sciences, Uzbekistan

**A Review: Discrete and Semi-discrete Multidimensional Solitons and Vortices -- Established Results and Novel Findings**

**Boris Malomed**

Tel Aviv University, Israel

**Stability of KdV Solitons with Respect to Transverse Perturbations: Absolute and Convective Instabilities**  
**Michael Ruderman**

University of Sheffield, UK

**Co-authors: Nikolai Petrukhin, Efim Peinovsky**

National Research University -- Higher School of Economics, Institut of Applied Physics RAS

**Symposium-12-2 (Track-3)** (15-min talk + 5-min Q&A)

**Nonlinear Dynamics of Engineering Systems**

(Session Chair: Pierpaolo Belardinelli)

**Attention is All You Need - an Interpretable Artificial Neural Network Architecture**

**Nico Novelli**

Polytechnic University of Marche, Italy

**Co-authors: Pierpaolo Belardinelli**

Polytechnic University of Marche, Italy

**The Influence of Friction on the Dynamics of Elastic Systems Susceptible to Stick-slip Motion**

**Migliaccio Giovanni**

University of L'Aquila, Italy

**Co-authors: Barsotti Riccardo, Bennati Stefano**

University of Pisa, Italy; University of Pisa, Italy

**Disturbance Analysis of an Interconnected Power System**

**Yizi Cheng**

Nanjing Normal University, China

**Co-authors: Fuhong Min**

Nanjing Normal University, China

**Nonlinear Electromagnetic Tuned Mass Damper and Energy Harvesting System Using on the Highspeed Railway Bridges**

**Chuan Guo**

Sichuan University of Science and Engineering, China

**Damping Destabilization Phenomena in Nonlinear Mechanical Systems**

**Migliaccio Giovanni**

University of L'Aquila, Italy

**Co-authors: D'Annibale Francesco**

University of L'Aquila, Italy

**Symposium-13-2 (Track-4)** (15-min talk + 5-min Q&A)

**Theory and Applications in Nonlinear Dynamical Systems**

(Session Chair: Maaita Jamal- Odysseas)

**Physical Formation of Entangled Energy Sinks by Curving a Euclidean phase space**

**Ioannis Georgiou**

National Technical University of Athens, Greece

**Identification of Reduced-order Fractional Models: A Unified Approach**

**Juan J. Gude**

University of Deusto, Spain

**Co-authors: Gaizka Heppe, Pablo Garcia Bringas**

University of Deusto, Spain

**Solutions of Stars in General Relativity**

**Nikolaos Chatzarakis**

Trinity College Dublin, Ireland

**Controlling Couette Flow via Alternating Axial Mass Flux**

**Sebastian A. Altmeyer**

Universitat Politecnica de Catalunya, Spain

**An Epidemic Model for Competing Variants within the Same Strains Based on Total**

**Vasileios Vachtsevanos**

Aristotle University of Thessaloniki, Greece

**Co-authors: Meletlidou Efthymia**

Aristotle University of Thessaloniki, Greece

4:30 - 4:45 pm

**Tea Break**

4:45 pm - 6:15 pm

**Symposium-10-1 (Track-1)** (15-min talk + 5-min Q&A)

### Testing and Identification of Mechatronic Systems with Nonlinearities

(Session Chair: Pawe Olejnik)

#### Exploring Approximate Analytical Techniques for Solving Dynamical Problems

**Muhammad Umer**

Lodz University of Technology, Poland

**Co-authors: Pawel Olejnik**

Lodz University of Technology, Poland

#### Dynamics of Oscillators with Magnet-coil interaction

**Mateusz Wojna**

Lodz University of Technology, Poland

**Co-authors: Dariusz Grzelczyk, Ewelina Oginska, Grzegorz Wasilewski, Jan Awrejcewicz**

Lodz University of Technology, Poland

#### Dynamics of a Magnetic Pendulum Under Time-Varying Excitation

**Yared Desta**

Lodz University of Technology, Poland

**Co-authors: Tsegaye Getachew Alenka**

Wolaita Sodo University, Ethiopia

#### Analysis of Isolated Branches of Periodic Orbits in 1DOF Parametric Oscillator

**Muhammad Junaid U Rehman**

Lodz University of Technology, Poland

**Co-authors: Grzegorz Kudra, Jan Awrejcewicz**

Lodz University of Technology, Poland

### Symposium-4-3 (Track-2) (20-min talk + 5-min Q&A)

#### Solitons and Other Localized Structures in Physical and Mathematical Sciences

(Session Chair: Yury Stepanyants)

#### Evolution of Quasi-periodic Internal Waves with Rotation

**Karima Khusnutdinova**

Loughborough University, UK

**Co-authors: Korsarun Nirunwiroj, Dmitri Tseluiko**

Loughborough University, UK

#### On Group Foliations and Invariant Solutions of the Beta-plane Barotropic Vorticity Equation

**Evgenii Kaptsov**

HSE University, Russia

#### Three-wave System and Spectral Curves

**Aleksandr O. Smirnov**

Institute of Applied Physics RAS, Nizhny Novgorod, Russia

**Co-authors: Danil A. Aleksandrov, Gleb A. Tulpanov**

St.-Petersburg State University of Aerospace Instrumentation

#### Collapses in 3-D free-surface Boundary Layers

**Victor Shrira**

Keele University, UK

**Co-authors: Joseph Oloo**

Napier University, UK

**Symposium-17-1 (Track-3)** (15-min talk + 5-min Q&A)

**Advanced Measurement, Analysis and Control for Nonlinear Science and Complexity**

(Session Chair: Zhenzhen Wang)

**Distributed Observer-Based Consensus Control of Multiple-UAVs Under Dos Attacks**

**Yutao Zhu**

Wuhan Textile University, China

**Co-authors: Guopeng Zhou, Peng Jin**

Wuhan Textile University, China

**Optimal Formation Control for Full-state Constrained Quadrotor UAVs Based on RL**

**Youneng Li**

Wuhan Textile University, China

**Co-authors: Guopeng Zhou, Peng Jin**

Wuhan Textile University, China

**Integrated Power and Surface Conservation Control of Constrained Gyroelastic Body Based on V-gimbaled VSCMGs**

**Chuandong Guo**

Sichuan University of Science and Engineering, China

**Co-authors: Lijia Cao**

Sichuan University of Science and Engineering, China

**Frequency Analysis of Simply Supported Spinning Pipes Conveying Fluid**

**Ali Fasihi**

Lodz University of Technology, Poland

**Co-authors: Grzegorz Kudra, Maryam GhandchiTehrani, Jan Awrejcewicz**

Lodz University of Technology, Poland

**Aerosol Transport - Application to Transmission of COVID-19 in Indoor Environmen**

**Goodarz Ahmadi**

Clarkson University, USA

**New Quality Productivity and Corporate Financialisation**

**Chuan Zhang**

Shanghai Maritime University, China

**Co-authors: Yueyun Wang**

Shanghai Maritime University, China

**Symposium-13-3 (Track-4)** (15-min talk + 5-min Q&A)

**Theory and Applications in Nonlinear Dynamical Systems**

(Session Chair: Maaita Jamal- Odysseas)

**The Electrodynamical Origin of the Wave-particle Duality**

**Alvaro Garcia**

Universidad Rey Juan Carlos, Spain

**Lorenz-like Systems and Active Wave-particle Entities**

**Rahil Valani**

University of Oxford, UK

**The Method of Lagrangian Descriptors and its Connection to an Uncertainty Quantification Method**

**Makrina Agaoglou**

**Co-authors: G. Garcia-Sanchez, A.M. Mancho, S. Wiggins**

Universidad Politécnica de Madrid, Spain

**Two-parametric Families of Orbits Generated by Three-dimensional Central and Polynomial Potentials: an Application to the 3D Harmonic Oscillator**

**Thomas Kotoulas**

Aristotle University of Thessaloniki, Greece

**Dynamics of Complex Biological Leukemia SICW Model: Mathematical and Simulation Approach**

**Kalyan Das**

National Institute of Food Technology Entrepreneurship and Management (NIFTEM-K), India

**Co-authors: G. Ranjith Kumar**

Anurag University, India

6:15 pm- 6:30 pm

**Conference Closing Ceremony**

6: 30 pm - 8:00 pm

**Dinner**



# 07 MAP





# 08 SPONSORS



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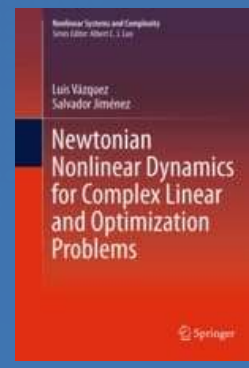
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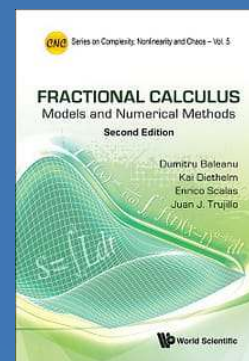
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# 09 ABOUT SUSE

## Sichuan University of Science and Engineering

Sichuan University of Science and Engineering, established in 1965, is a full-time institution of higher learning with nearly 60 years undergraduate education and 20 years postgraduate education history in coordinated development of multiple disciplines including engineering, science, management, pedagogy, literature, history, art, law, economics, agriculture and medical science.



Situated in Zigong and Yibin, two famous historical and cultural cities, the university consists of the four campuses of Libaihe, Huidong, Yibin and Huangling, covering a total area of more than 4,600 mu, with gross floor area of 1.7 million m<sup>2</sup>. Currently, the university boasts total paper literature of more than 3.07 million volumes, total electronic books of more than 1.65 million volumes, 10,24-degree theses, 124 Chinese and foreign language databases (including subbases) and has built 10 special databases. This university has become the only one engineering dominated comprehensive university with the longest history of undergraduate education in 100,000 km<sup>2</sup> of 20 prefectures and cities around South Sichuan, West Chongqing, Northeast Yunnan and Northwest Guizhou.



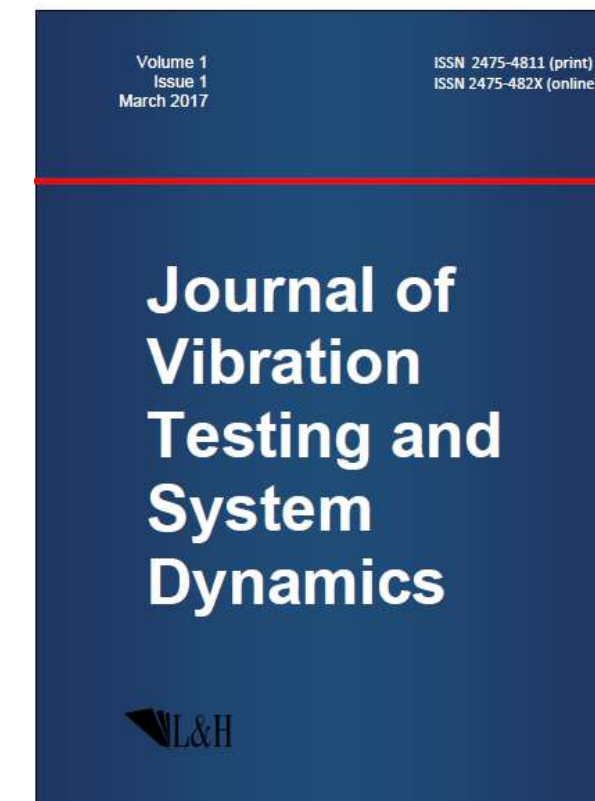
## The Artificial Intelligence Key Laboratory of Sichuan Province



The Artificial Intelligence Key Laboratory of Sichuan Province (hereinafter referred to as: the Laboratory), relying on Sichuan University of Science & Engineering and the State Grid Sichuan Electric Power Corporation Electric Power Science Research Institute, prepared to establish the Artificial Intelligence Key Laboratory of Sichuan Province (University) in 2001, and passed the acceptance of the Sichuan's Education Department in 2007. In 2009, it was accepted as the Key Laboratory of Sichuan Province by the Science and Technology Department of Sichuan Province. The laboratory deeply integrates new technologies such as artificial intelligence, big data, and Internet of Things, closely follows the development trend of artificial intelligence, and carries out scientific research in the fields of intelligent brewing, intelligent electric power, non-contact inspection of nuclear wastes, safety inspection of bridges, intelligent control of light industry, chemical industry and intelligent manufacturing. takes the initiative to serve the needs of regional economic and social development, and has formed a research system of intelligent detection, intelligent information processing, and intelligent control, as well as a laboratory characteristic of "research learning integration, industry education integration, and distinctive development".

## Journal of Vibration Testing and System Dynamics

Journal of Vibration Testing and System Dynamics is an interdisciplinary journal as a platform for facilitating the synergy of dynamics, experimentation, design, and education. The journal publishes high-quality, original articles that explore the theory, modelling, and application of dynamical systems and data-driven dynamics for high-impact engineering solutions. Manuscripts exploring data science, machine learning, and artificial intelligence to the design and control of complex dynamical systems including cell and neuro networks are solicited. Articles on data mining, deep learning and big data applicable to physical sciences and large-scale dynamic systems are equally encouraged. Progress made in the following topics, but not limited to, are of interest to the journal:



- Data-Driven Dynamics and Control
- Design for Dynamic
- Dynamics of Continuum
- Biological and Biomedical Physics
- Complex Networks and Systems
- Chemical Dynamics