TABLE OF CONTENTS

NEWSLETTER

of the International Society of Difference Equations

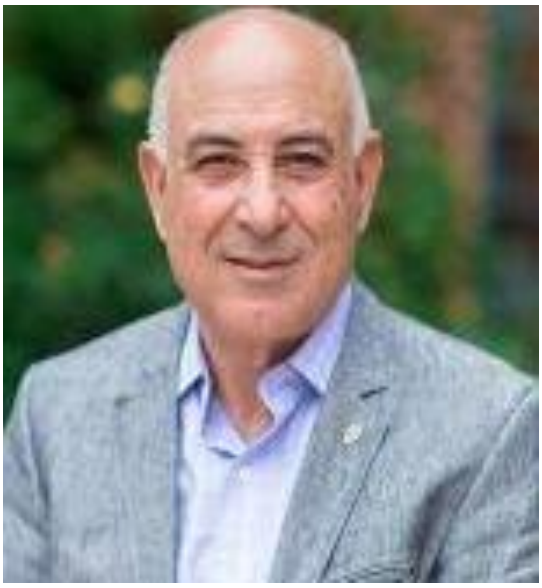
Volume 10 | Issue 2 | October 2025

ISDE International Society of Difference Equations ISDE

http://isdeds.com/

International Society of Difference Equations

A LETTER FROM THE PRESIDENT



Dear ISDE Members,

As 2025 draws to a close, I extend my warmest greetings and best wishes to all of you. This year has been both productive and inspiring for our Society, marked by renewed connections, lively scientific exchange, and steady progress in our shared mission to advance the theory and applications of difference equations and discrete dynamical systems.

The International Conference on Difference Equations and Applications (ICDEA 2025), held in Guangzhou, China (July 15–19, 2025), was a great success. It brought together scholars from around

the world for stimulating talks, collaborative discussions, and memorable cultural experiences. I thank the organizing committee and all participants for their dedication and enthusiasm.

Our Society also proudly sponsored Progress on Difference Equations (PODE 2025), which was held in Cartagena, Spain. The conference offered another valuable platform for collaboration and for showcasing new results in nonlinear dynamics and applications.

Looking ahead, ICDEA 2026 will take place in Milan, Italy, on 13-17 July 2026. The second ISDE - sponsored conference is the European Conference on Iteration Theory (ECIT 2026) which will be held on 9-12 June in Norway at Farsund Resort (https://www.farsundresort.no/). I warmly encourage all members to take part in these meetings, submit their latest work, and propose special sessions to continue expanding the impact of our field.

The *Journal of Difference Equations and Applications* (*JDEA*) is the official journal of the society. It continues to thrive, thanks to the dedicated efforts of our editors, reviewers, and contributors.

I would also like to thank Adina Sasu, our new Newsletter Editor, for taking on this important role, and Eddy Kwessi, our Webmaster, for maintaining and improving our online presence.

As always, ISDE's strength lies in its members, their creativity, generosity, and collaboration. I look forward to seeing you all in Milan and/or Farsund resort next summer and to celebrating the continued vitality of our Society.

Since there are no required ISDE membership dues, I would like to invite you all to become sponsoring members (Regular: annual dues $100 or $50 for students and members from developing countries, Gold: annual dues $150). Moreover, donations to our society are greatly appreciated.

With warm regards,

Saber Elaydi

President, International Society of Difference Equations (ISDE)

San Antonio, October 2025

ISDE International Society of Difference Equations ISDE

FOREWORD

Dear ISDE members,

The present Newsletter of the *International Society of Difference Equations* brings together information about the events that took place this year: PODE 2025 (Cartagena, Spain) and ICDEA 2025 (Guangzhou, China). In addition, two sections are dedicated to the prestigious prizes of our society: the JDEA Best Paper Prize and the Bernd Aulbach Prize, awarded in July 2025.

This newsletter was elaborated as a teamwork. The part regarding the ISDE conferences organized in 2025 was prepared jointly with Saber Elaydi, Laura Gardini, Jose Cánovas and Bo Zheng. The sections about the prizes awarded by our society - the Bernd Aulbach Prize and the JDEA Best Paper Prize - were elaborated jointly with Saber Elaydi. I would like to express my special thanks to all of them for this collaboration. Furthermore, we are all very grateful to the colleagues who provided us with photos for this newsletter and relevant material for its accomplishment.

I hope you will enjoy reading this newsletter and that you will attend our society's future conferences and events. Moreover, I look forward to meeting you in person somewhere soon!

With my best wishes,
Adina Luminița Sasu

Timișoara, October 10, 2025

PODE 2025

Progress on Difference Equations - PODE 2025 was held at Universidad Politécnica de Cartagena, Cartagena, Spain, in the period 28th - 30th May 2025. This was the 14th International Conference which followed those held each year since 2007 on the same topics. Recall that after 2017, the conference PODE alternated each year with the European Conference on Iteration Theory - ECIT and therefore it was held every two years.

Group photo PODE 2025

PODE 2025 was held under the auspices of the International Society for Difference Equations, the Group of Dynamical Systems of Murcia, the Department of Mathematics of the Universidad de Murcia and the Department of Applied Mathematics and Statistics of Universidad Politécnica de Cartagena. Cartagena is a small city located in the southeast of Spain, with an excellent natural harbour and a history of more than 2000 years.

The conference was a forum for young and senior researchers to share their work and discuss the latest developments in the areas of difference equations, discrete dynamical systems, functional equations and their applications. The number of participants was 42, with five plenary speakers, 25 contributed talks and three posters. The plenary speakers were Saber Elaydi, Lluís Alsedá, Senada Kalabušić, Víctor Mañosa and Davide Radi.

Saber Elaydi

Senada Kalabušić,

Lluís Alsedá

Víctor Mañosa

Davide Radi

The members of the organizing committee are warmly congratulated for this very successful event. There were two social events connected to the conference: a visit to the Roman Theatre of Cartagena and a visit of the natural habour on a touristic ship.

Organizing Committee:

- Jose S. Cánovas, Department of Applied Mathematics and Statistics, Technical University of Cartagena
- María Muñoz Guillermo, Department of Applied Mathematics and Statistics, Technical University of Cartagena
- María del Carmen Ruiz Abellón, Department of Applied Mathematics and Statistics, Technical University of Cartagena
- Gabriel Soler López, Department of Applied Mathematics and Statistics, Technical University of Cartagena
- Antonio Linero Bas, Department of Mathematics, Murcia University
- José Ginés Espín, Department of Mathematics, Murcia University
- Víctor Jiménez López, Department of Mathematics, Murcia University

Some members of the Organizing Committee of PODE 2025, from left to right:
Jose Ginés Espín, Antonio Linero, Gabriel Soler, Víctor Jiménez and Jose S. Cánovas

Scientific Committee:

- Saber Elaydi, Trinity University, USA
- Laura Gardini, University of Urbino Carlo Bo, Italy
- Armengol Gasull, Universitat Autònoma de Barcelona, Spain
- René Lozi, Université Côte d'Azur, France
- Adina Luminița Sasu, West University of Timișoara, Romania
- Lubomir Snoha, Matej Bel University, Slovakia
- Jose S. Cánovas, Technical University of Cartagena, Spain.

The **Book of abstracts** can be seen at the link:

https://www.dmae.upct.es/~pode25/abstracts/podefin.pdf

The **presentations** can be read at the link:

https://www.dmae.upct.es/~pode25/programme.php

Website: The conference webpage is:

https://www.dmae.upct.es/~pode25/

In this webpage you can find all the information on the event and more photos.

ICDEA 2025

The 30th International Conference on Difference Equations and Applications was be held on 15-19 July 2025 in Guangzhou, Guangdong Province, China. The aim of the conference was to bring together both experts and novices in the theory of difference equations, discrete dynamical systems and their applications to various sciences.

The 30th ICDEA was organized in hybrid mode, allowing both in-person and online attendance, and attracted over 340 participants from around the world, being one of the most successful conferences in society's history – see the program.

Group photo 1 - ICDEA 2025

The organizers coordinated by **Bo Zheng** as Chair and **Jianshe Yu** as Co-Chair of the Organizing Committee and the members of the Scientific Committee led by **Jim Michael Cushing** as Chair of the Scientific Committee are warmly congratulated for this memorable event. The committees of the conference were:

Organizing Committee

Bo Zheng - **Chair**
Guangzhou University, China

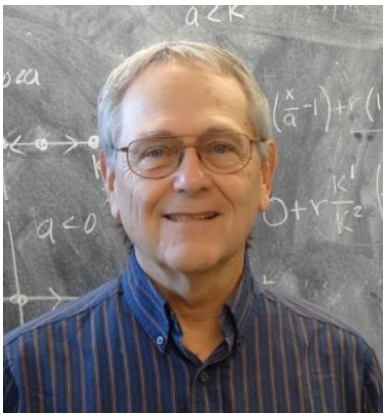
Jianshe Yu - **Co-Chair**
Guangzhou University, China

Local Organizing Committee:

Dingyong Bai	Hongpeng Guo	Zhiming Guo	Linchao Hu	Feng Jiao	Jia Li
Yijie Li	Genghong Lin	Yunfeng Liu	Zhigang Liu	Yuhua Long	Qiwen Sun
Kai Wang	Huafeng Xiao	Hong Zhang	Hongling Zhou	Zhan Zhou	

Group photo 2 - ICDEA 2025

Scientific Committee



Jim Michael Cushing - **Chair**
University of Arizona
USA

René Lozi
Université Côte d'Azur,
France

Adina Luminița Sasu
West University of Timișoara
Romania

Iryna Sushko
National Academy of Sciences
of Ukraine, Ukraine

Bo Zheng
Guangzhou University,
China

The **Plenary Speakers** at ICDEA 2025 were the following:

Stephen Baigent

Brian Arthur Coomes

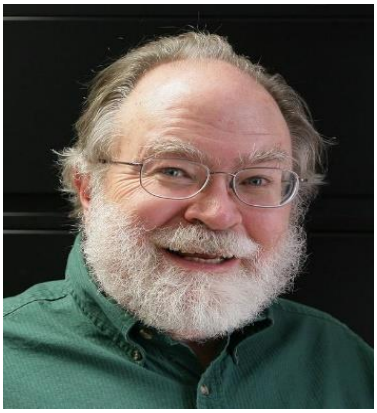
Saber Elaydi

Sorin Olaru

Hinke Osinga

Galina Strelkova

Serhiy Yanchuk



James A. Yorke

Guo-Cheng Wu

Jianshe Yu

Weinian Zhang

Xu Zhang

Wei-Mou Zheng

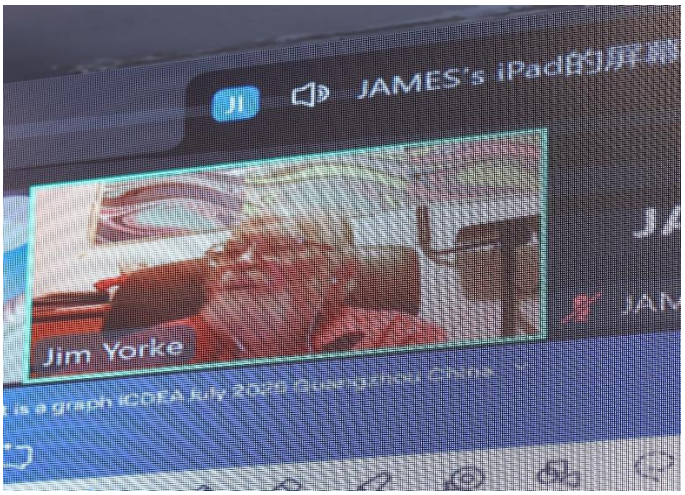
Selected photos from the conference

Opening Ceremony

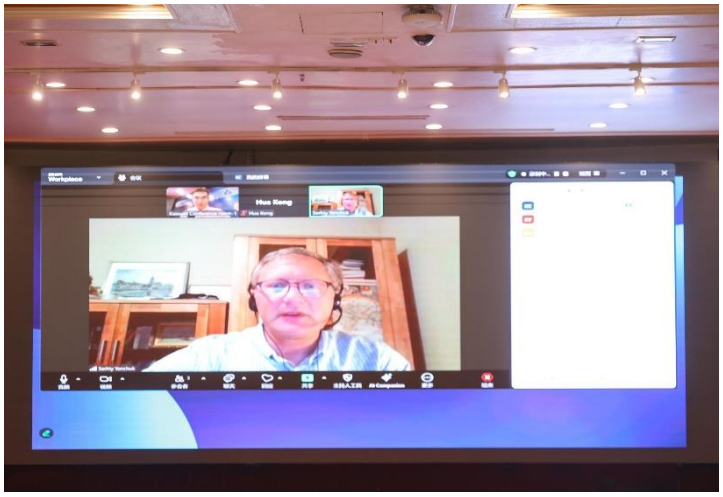
Opening Ceremony

PLENARY LECTURES AS SCHEDULED IN THE CONFERENCE PROGRAM

Plenary Talks: Saber Elaydi, Hinke Osinga, Wei-Mou Zheng, Sorin Olaru



Plenary talks: Weinian Zhang, Galina Strelkova, Xu Zhang, James Yorke, Stephen Baigent, Brian Coomes



ICDEA 2025

Plenary talks: Guo-Cheng Wu, Jianshe Yu, Serhiy Yanchuk

The conference hosted 39 special sessions devoted to a large variety of topics from difference equations, discrete dynamical systems and various applications – see:

https://icdea2025.sciencesconf.org/resource/page/id/10

The **Book of abstracts** can be downloaded here.

ISDE GENERAL MEETING

During ICDEA 2025, the ISDE General Meeting was held and chaired by the ISDE President Laura Gardini.

At this general assembly, the President announced the winner of the prestigious Bernd Aulbach Prize: **James A. Yorke**, Distinguished University Research Professor at the Department of Physics, University of Maryland, USA – see the section **06. Bernd Aulbach Prize 2025**.

Saber Elaydi, the Editor-in-Chief of the society's official journal – Journal of Difference Equations and Applications – announced the winners of the best papers published in 2024, namely

- Brian Arthur Coomes, Hüseyin Koçak and Kenneth James Palmer, **Homoclinic chaos in a perennial grass model**, Journal of Difference Equations and Applications 30 (10) (2024), 1493–1517.
- Xu Zhang and Guanrong Chen, **Diffeomorphisms with infinitely many Smale horseshoes**, Journal of Difference Equations and Applications 30 (12) (2024), 1866-1884.

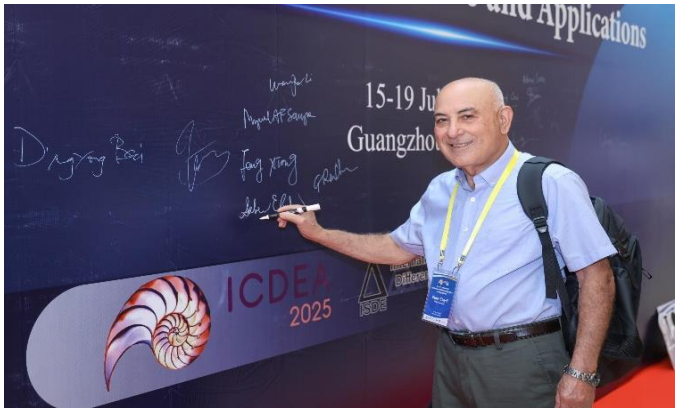
For more details – see the section **05. JDEA Best Paper Prize**.

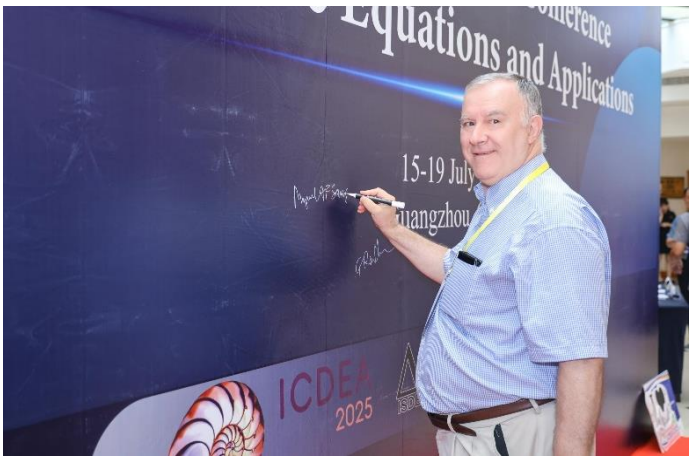
Furthermore, during the ISDE Meeting the President announced the forthcoming ISDE events:

- ICDEA 2026, Milan, Italy – Davide Radi presented the flyer
- ICDEA 2027 Osaka, Japan

ISDE Board members: Weinian Zhang, Adina Luminița Sasu, Laura Gardini, Saber Elaydi, René Lozi

A special attraction of the ICDEA 2025 was represented by the signature wall, where the participants gave autographs marking both their presence and enthusiasm.





Conference website:

≫ More details and information about the conference can be found on its website

https://icdea2025.sciencesconf.org/?lang=en

ICDEA 2025, the jubilee 30th edition of the official conference of ISDE was not only an academic event, but also a very enjoyable meeting connecting people through science, friendship, unity and solidarity, attesting once again that ISDE is a very strong community.

The organizing team

The local organizers

After the closing ceremony

» The photo gallery - 4090 beautiful photos - can be seen **here**

JDEA BEST PAPER PRIZE

The International Society of Difference Equations in collaboration with the Journal of Difference Equations and Applications (JDEA) - the official journal of the society, awards every year the JDEA Best Paper Prize. Based on the recommendation of the Prize Selection Committee approved by the Board of Directors this prize goes to the best paper published in the previous year in JDEA.

This prize has been awarded since 2002, during the ISDE Meetings at the ICDEA conferences. Taylor & Francis, the publisher of JDEA, awarded the winners £550.

At the 30th International Conference on Difference Equations and Applications, the JDEA Best Paper Prize was awarded to two articles:

- **Homoclinic chaos in a perennial grass model**, Journal of Difference Equations and Applications 30 (10) (2024), 1493–1517, authors Brian Arthur Coomes and Hüseyin Koçak Department of Mathematics and Computer Science, University of Miami, Coral Gables, FL, USA and Kenneth James Palmer Department of Mathematics, National Taiwan University, Taipei, Taiwan.

The full article can be downloaded here:

https://www.tandfonline.com/doi/full/10.1080/10236198.2023.2236728

- **Diffeomorphisms with infinitely many Smale horseshoes**, Journal of Difference Equations and Applications 30 (12) (2024), 1866-1884, authors Xu Zhang, Department of Mathematics, Shandong University, Weihai, Shandong, People's Republic of China and Guanrong Chen, Department of Electrical Engineering, City University of Hong Kong, Hong Kong SAR, People's Republic of China.

The full article can be downloaded here:

https://www.tandfonline.com/doi/full/10.1080/10236198.2024.2368170

The authors representatives were invited to give Plenary talks at ICDEA 2025 as follows:

- Brian Arthur Coomes, Homoclinic chaos
- Xu Zhang, Diffeomorphisms with infinitely many Smale horseshoes

JOURNAL OF DIFFERENCE EQUATIONS AND APPLICATIONS
2024, VOL. 30, NO. 10, 1493–1517
https://doi.org/10.1080/10236198.2023.2236728

Homoclinic chaos in a perennial grass model

B. A. Coomes[a], H. Koçak[a] and K. J. Palmer[b]

[a]Departments of Mathematics and Computer Science, University of Miami, Coral Gables, FL, USA;
[b]Department of Mathematics, National Taiwan University, Taipei, Taiwan

ABSTRACT

The second-order difference equation $x_{n+1} = ax_n + (b + cx_{n-1})e^{-x_n}$, where $0 < a < 1$, $0 < b$ and $0 < c < 1$, has been used to model the generations of the perennial grass *Agrostis scabra*. The permanence of the solutions was proved. For certain parameter values in this model, and in the data from field studies, chaotic dynamics was conjectured. In this study, with the aid of a homoclinic shadowing theorem, we prove the existence of a transversal homoclinic orbit, hence the presence of chaotic dynamics, for certain parameter values of this second-order difference equation.

ARTICLE HISTORY
Received 18 May 2023
Accepted 4 July 2023

KEYWORDS
Perennial grass; permanence; chaos; homoclinic shadowing; continuation

MATHEMATICS SUBJECT CLASSIFICATIONS
39-08; 39A33; 39A60; 37D45; 37N25

JOURNAL OF DIFFERENCE EQUATIONS AND APPLICATIONS
2024, VOL. 30, NO. 12, 1866–1884
https://doi.org/10.1080/10236198.2024.2368170

LOZI, HÉNON, AND OTHER CHAOTIC ATTRACTORS, THEORY AND APPLICATIONS

Diffeomorphisms with infinitely many Smale horseshoes

Xu Zhang[a] and Guanrong Chen[b]

[a]Department of Mathematics, Shandong University, Weihai, Shandong, People's Republic of China;
[b]Department of Electrical Engineering, City University of Hong Kong, Hong Kong SAR, People's Republic of China

ABSTRACT

A class of planar diffeomorphims is formulated, with infinitely many coexisting Smale horseshoes, where the Lebesgue measure of the parameters with such strange dynamics is infinite. On each horseshoe, there exists a uniformly hyperbolic invariant set, on which the map is topologically conjugate to the two-sided full-shift on two symbols. Moreover, the topological entropy is infinite in certain parameter regions.

ARTICLE HISTORY
Received 29 January 2024
Accepted 7 June 2024

KEYWORDS
Smale horseshoe; hyperbolic invariant set; symbolic dynamical system; coexistence

2020 MATHEMATICS SUBJECT CLASSIFICATIONS
37D45; 37D20; 37D05; 37E30

Xu Zhang, Plenary talk, ICDEA 2025

Brian Coomes, online Plenary Talk, ICDEA 2025

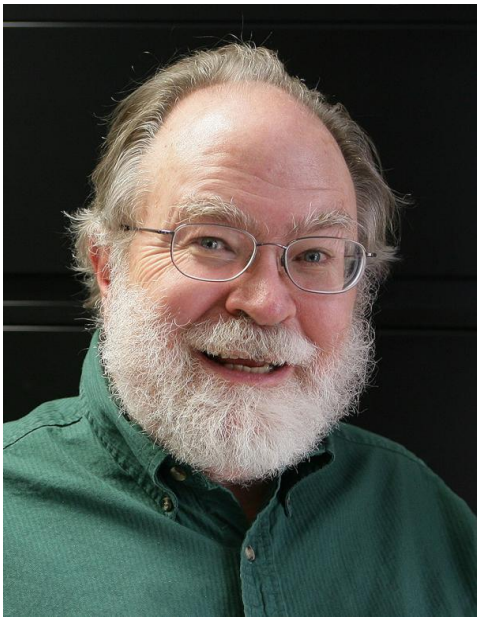
The winners of the JDEA paper prize(s) were announced during the ISDE General Meeting by Saber Elaydi, the Editor-in-Chief of the Journal of Difference Equations and Applications and the President of the Prize Committee.

Saber Elaydi congratulating Guanrong Chen and Xu Zhang
as winners of the JDEA Best Paper Prize

The winners of the JDEA Best Paper Prize Brian Coomes, Hüseyin Koçak and Kenneth Palmer attended ICDEA 2025 remotely, and received the well-deserved honors at the ISDE Meeting.

All the winners are warmly congratulated on their achievements !

BERND AULBACH PRIZE 2025



James A. YORKE

The Laureate of the **Bernd Aulbach Prize 2025**

James A. Yorke Distinguished University Research Professor at the Department of Physics, University of Maryland, USA, is the winner of the Bernd Aulbach Prize 2025.

The Bernd Aulbach Prize was established in 2009 by ISDE to honor the memory of the founding member and first President of ISDE, the late Bernd Aulbach, who passed away in 2005. The Bernd Aulbach Prize is a very prestigious prize of the International Society of Difference Equations, being awarded every two years for significant contributions to the areas of difference equations and/or discrete dynamical systems.

We present in what follows a selection of the main arguments from the **Laudatio** that supported his nomination for this award.

James A. Yorke is one of the most influential mathematicians of our time. His pioneering work in dynamical systems, chaos theory, and applications of mathematics across disciplines has profoundly shaped modern science.

Major Achievements and Contributions

- **Founding Chaos Theory**: Together with Tien-Yien Li, James Yorke coined the term chaos in their landmark 1975 paper "*Period Three Implies Chaos*", a work that revolutionized dynamical systems and has been cited tens of thousands of times.
- **Leadership in Dynamical Systems**: Yorke's contributions span smooth and non-smooth systems, difference equations, differential equations, and random dynamical systems, always combining mathematical depth with visionary breadth.
- **Cross-Disciplinary Impact**: His research extends far beyond mathematics, influencing physics, biology, epidemiology, meteorology, and engineering. He has applied nonlinear dynamics to the spread of infectious diseases, population biology, weather prediction, and control theory.
- **Mentorship and Collaboration**: James Yorke has mentored numerous doctoral students, postdocs, and collaborators worldwide, fostering the growth of an entire generation of scholars in nonlinear dynamics and difference equations.
- **Recognition**: Among his many honors, James Yorke received the 2003 Japan Prize for Science and Technology for his work on chaos, one of the world's most prestigious awards. He is a member of the U.S. National Academy of Sciences and a Fellow of the American Academy of Arts and Sciences.

Relevance to Difference Equations and the ISDE Community

Yorke's work is deeply tied to difference equations and discrete dynamical systems, the very foundation of the International Society of Difference Equations (ISDE). His studies of nonlinear maps, population models, and chaotic dynamics continue to inspire research in our community. His vision has unified discrete and continuous dynamics, providing powerful tools to address real-world problems.

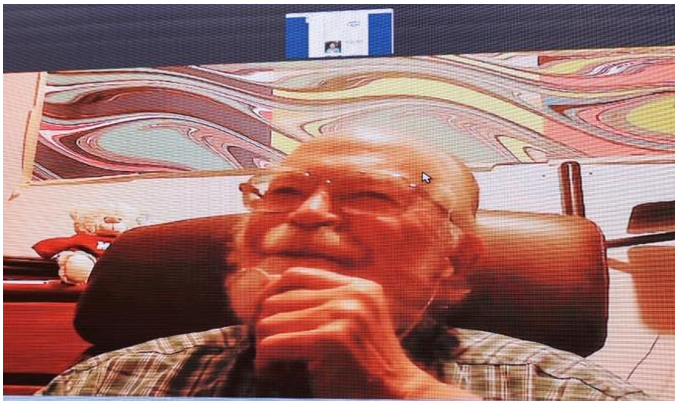
Broader Impact

James Yorke's influence is unparalleled. His research has transformed the way scientists view determinism and unpredictability, offering a new paradigm for understanding complexity in nature. Beyond mathematics, his ideas have penetrated public discourse, making "chaos theory" a household phrase. His contributions epitomize the spirit of the Aulbach Prize: deep mathematical innovation coupled with global scientific and cultural impact.

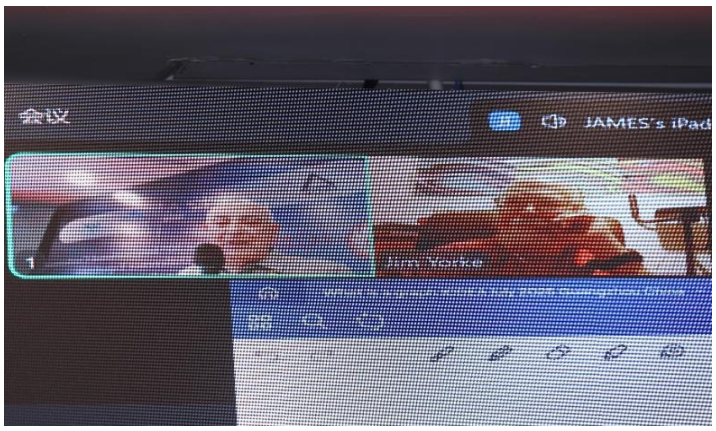
Conclusions

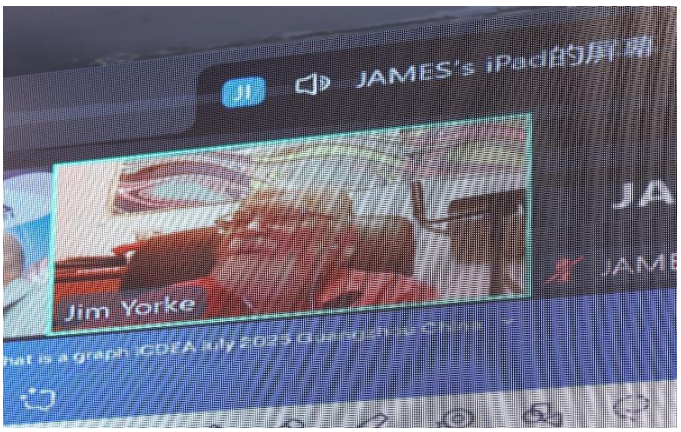
For his groundbreaking contributions to dynamical systems, his founding role in chaos theory, his leadership in mathematics and its applications, and his profound influence on science and society, the Bernd Aulbach Prize 2025 was awarded to James A. Yorke.

The award was announced by the ISDE President Laura Gardini jointly with Saber Elaydi, the new elected ISDE President, during the General ISDE Metting.



James A. Yorke gave an invited **Plenary Lecture** at ICDEA 2025 entitled What is the graph of a dynamical system? Saber Elaydi was the Chair of the plenary session and presented the main achievements of the laureate.





James Yorke online talk during ICDEA 2025

Awarding this prestigious prize to an outstanding personality like James A. Yorke is a great honor for our society and a landmark event. James Yorke will always be a remarkable Ambassador for ISDE and its goals of promoting difference equations and discrete dynamical systems.

James Yorke is warmly congratulated on this prestigious award !

International Society of Difference Equations
ISDE ISDE

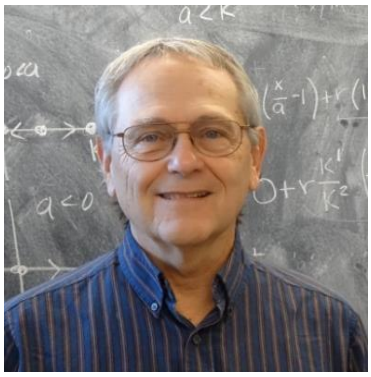
ISDE BOARD OF DIRECTORS 2025-2027

Saber Elaydi
Trinity University
USA
President

Laura Gardini
University of Urbino Carlo Bo, Italy
Vice President

Martin Bohner
Missouri University of Science and Technology
USA

Elena Braverman
University of Calgary
Canada



Jim Michael Cushing
The University of Arizona
USA

René Lozi
Université Côte d'Azur, France

Adina Luminița Sasu
West University of Timișoara
Romania

Iryna Sushko
National Academy of Sciences of Ukraine

Weinian Zhang
School of Mathematics, Sichuan University, China

GOALS OF THE SOCIETY

- To promote difference equations and discrete dynamical systems, defined broadly, as one of the fundamental subjects in Mathematics.
- To promote discrete models as models of premiere mathematical importance in the natural sciences, engineering, economics, etc.
- To coordinate activities in the area of difference equations such as organizing conferences, annual meetings, workshops, special sessions, etc.
- To lend support to researchers in difference equations from developing countries and those who need help by making available copies of research articles, lecture notes, technical reports and books.
- To promote the publication of books, monographs, lecture notes and expository articles in the area of difference equations.