



Program CHAOS2023

16th Chaotic Modeling and Simulation International Conference

Heraklion, Crete, Greece, 13 – 16 June, 2023 Hybrid

Tuesday, 13.6.2023

TIME ZONE: [EEST — Eastern European Summer Time](#)

Venue: Hellenic Mediterranean University

Building K45 (School of Health Sciences, Lecture rooms)

8:30 - 10:00

Room 1

Registration

10:00 - 10:20

[Room 1](#)

Opening

10:20-11:00

Plenary Session

[Room 1](#) (PS1)

Chair: Christos Floros

Speaker: **Christos H Skiadas, ISAST Chair**

Title: Theory vs Applications? Lessons Learned from Modeling (on site)

11:00- 11:30 Coffee Break

11:30-14.00

SCS1

Special and Contributed Sessions

[Room 1](#)

[Room 2](#)

[Room 3](#)

SPECIAL SESSION: Cycle and Complex Dynamics in Economic Financial Models

Chair: Beatrice Venturi

Bifurcations - Attractors Applications

Chair: Victor Law

Chaotic Problems

William A Barnett-Giovanni Bella-Paolo Mattana-Ghosh Taniyad-Beatrice Venturi

Chaos and Global Indeterminacy in New Keynesian Macroeconomics (virtual)

Victor J Law-Denis P Dowling
Microwave-assisted Synthesis of Au and Ag Nanoparticles: Process Energy Calculations (on site)

Kristen Bestavros-Nachiket Karve-Kevin Reiss-David K. Campbell
The Approach to Equilibrium in the Fermi Pasta Ulam Tsingou (FPUT) Problem

Francesca Grassetti-Cristiana Mammana-Elisabetta Michetti
Environmental Tax and Environmental Awareness. How they affect the Economy and the Environment in a Dynamic Framework

Ernesto P. León
Creep Damage in Concrete Silos under High Temperatures

Meflah. Mabrouk-Ataouat. Mohamed
Study of Viscoelastic Fourth-order Problem (virtual)

Antonio Di Bari-Domenico Santoro-Giovanni Villani

Jose-Luis Echenausía-Monroy-Rodolfo J. Escalante-González-Eric Campos-

Alexandros Garefalakis-Konstantina Ragazou-Ioannis Passas-Konstantinos Spinthiropoulos-George Sklavos

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|---|---|--|
| BERTWitz: How Sentiment Score Can Improve Portfolio Optimization via LSTM predictions (virtual) | Cantón-Hector E. Gilardi-Velázquez Codification of Images Based on Deterministic Brownian Motion (on site) | Mapping the Factors Influencing Greek Youth's HEI Students Entrepreneurial Intention in Time of Crisis: A Multinomial Logistic Regression Analysis (on site) |
| Marco Desogus Principal Component Analysis on Granularity and Instability of Economic Systems in Emerging Countries (virtual) | Eric Campos-Cantón-Rodolfo J. Escalante-González-Bahia B. Cassal-Quiroga-Claudio A. García-Grimaldo One-directional Grid Scroll Hidden Attractor on the Plane (on site) | Yiannis Yiannoulis and Dimitrios I. Vortelinos Audit Opinion in Relation to Ratios and Fraud Variables: Evidence from Greece (on site) |
| Alessandro Fiori Maccioni Instability in an Agent-Based Model of Exchange Economy | Soumitro Banerjee-Sishu Shankar Muni Bifurcations of Mode-locked Periodic Orbits | Bernd Binder Spin/Wave Dynamics and Sound of Time-Discrete Rotation-Translation-Reflection Sequences |
| Alberto Russo-Francesca Usai Relationship between Economic Inequality and Crime through an Agent Based Model Approach | | Shunji Kawamoto 3-D Discrete Eddy and Convection for the Turing Model (on site) |
| Stefano Zedda-Simone Sbaraglia Which Interbank Net is the Safest? | | |
| Luca Grilli and Domenico Santoro How Boltzmann Entropy can improve financial time series forecasting (virtual) | | |
| 14:00-15:00 Lunch | | |
| <p>15:00-15:40 Room 1 (PS2) Plenary Session Chair: Christos Floros Speaker: Anastasios (Tassos) Bountis <i>Professor Emeritus, Department of Mathematics, University of Patras, Patras, Greece</i> Title: Long Range Interactions Enhance Global Stability in 1-D Hamiltonian Lattices (on site)</p> | | |
| 15:40 -16:00 Coffee Break | | |
| <p>16:00-16:40 Room 1 (PS3) Plenary Session Chair: Christos H Skiadas Speaker: Asher Yahalom <i>Department of Electrical & Electronic Engineering</i> <i>Center for Astrophysics, Geophysics, and Space Sciences (AGASS)</i> <i>Ariel University</i> Title: A Fisher Information Perspective of Relativistic Quantum Mechanics (on site)</p> | | |
| End of the 1st Day | | |



Program CHAOS2023

16th Chaotic Modeling and Simulation International Conference

Heraklion, Crete, Greece, 13 – 16 June, 2023 Hybrid

Wednesday, 14.6.2023

TIME ZONE: [EEST](#) — Eastern European Summer Time

10:00-11:30

SCS3

Special and Contributed Sessions

| Room 1 | Room 2 | Room 3 |
|---|--|--|
| Non-linear analysis - Plasma | Chaotic Aspects | Special Session I: Field-theoretic and Statistical Models of Stochastic Dynamics, Developed Turbulence and Critical Phenomena |
| Chair: Victor Law | Chair: Evangelia Petraki | Chairs: Michal Hnatič and Tomáš Lučivjanský |
| Sónia H. Marques On the Efficiency and Accuracy of the FORM Algorithm Applied to Nonlinear Models for Geotechnical Design (virtual) | Eyup Eroz-Erkan Tanyildizi-Fatik Özkaynak Substitution-box Generator Based on Chaotic Linear Feedback Shift Register | D. Davletbaeva-M. Hnatič-M. V. Komarova-T. Lučivjanský-L. Mižišin-M. Yu. Nalimov The Viscosity Coefficient on the Vicinity Superfluid Phase Transition: Renormalization Group Analysis (on site) |
| Luc Pastur-Nan Deng-Bernd R. Noack The Fluidic Pinball: A Benchmark Configuration for Reduced-order Modelling in Nonlinear Fluid Dynamics (on site) | Eyup Eroz-Erkan Tanyildizi-Fatih Özkaynak Chaotic PCG - A New Key Generation Algorithm Based on Chaotic Selection | M. Hnatič-T. Lučivjanský-L. Mižišin-Yu. Molotkov-A. Ovsianikov Helical Magnetohydrodynamic Turbulence: Two-Loop Approximation (on site) |
| Berenice Rojo-Garibaldi-Manuel Contreras-López-Simone Giannerini-David Alberto Salas-de-León-Thomas Henry Seligman-Vázquez-Guerra Verónica-Julyan H. E. Cartwright Nonlinear Analysis of El Niño-Southern Oscillation Events from Coastal Temperature Time Series in the Eastern South Pacific: Implications for the Regional Bioclimate System (virtual) | Avadis S. Hacınlıyan-E. Kandıran-S. Vatansever Possible Chaotic Behavior in Models Inspired by Field Theories | M. Hnatič-T. Lučivjanský-L. Mižišin-Yu. Molotkov-A. Ovsianikov Instabilities in Helical Magnetohydrodynamic Turbulence: Field-theoretic Approach (on site) |
| Teddy Craciunescu-Andrea Murari Dynamical and Statistical Indicators for Fusion Plasma Disruption Prediction (on site) | Omer Kaya-Fatih Ozkaynak A Robust Cryptographic Primitive Based on Chaotic System and Lava Lamp | M. Hnatič-T. Lučivjanský-L. Mižišin-Yu. Molotkov-A. Ovsianikov Magnetohydrodynamics as a Field Theory: Two-loop Calculation of Three-point Vertex Function (on site) |
| Gianluca Spizzo-Marco Veranda Weak Chaos in the Plasma of a Fusion Device (on site) | Abdelbaki Laidoune Improve the Organizational Reliability of Socio-technical Systems by Using the Chaotic Approach | V.G. Zhulego-A.A. Balyakin-M.V. Sorokin On Convergence and Depopulation in a Center-Periphery System (on site) |

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| Yiannis Dimotikalis and Christos H Skiadas Max Entropy Frontier Simulation on Portfolio Diversification (on site) | | |
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| 11:30- 12:00 Coffee Break | | |
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| 12:00-14:00 | | |
| SCS4 | | |
| Special and Contributed Sessions | | |
| <u>Room 1</u> | <u>Room 2</u> | <u>Room 3</u> |
| Chaos – Chaotic Bihaviour Chair: Andre E. Botha | Special Session Complex Nonlinear Dynamics toward Chaotic Supremacy Chairs: Fumiyoshi Kuwashima and Takashi Isoshima | Special Session II: Field-theoretic and Statistical Models of Stochastic Dynamics, Developed Turbulence and Critical Phenomena Chairs: Michal Hnatič and Tomáš Lučivjanský |
| Fatih Özkaynak-Ahmet Can Çakıl A New Cryptographic Key Generator Algorithm Based on Chaos-based Selection Approach of Prime Numbers in Blum Blum Shub Generator | Kenji Wada-Tokihiro Kitagawa-Tetsuya Matsuyama-Koichi Okamoto-Fumiyoshi Kuwashima Simultaneous Multimode Chaotic Oscillation by Optical delayed Feedback in Fabry-Perot Laser Diodes | Michal Hnatič-Matej Kecer-Tomáš Lučivjanský Renormalization Group Study of Two-species Reaction-diffusion System: Influence of Random Velocity Fluctuations (on site) |
| Wojciech Szumiński Double Swinging Atwood’s Machine – from Hyperchaos to Superintegrability | Takashi Isoshima Two-dimensional Optical Bistable Device with External Feedback for Complex Dynamics (on site) | M. Hnatič-M. Kecer-T. Lučivjanský-L. Mižišin-Yu. G. Molotkov Renormalization Group Study of Isotropic Percolation Process: Three-loop Approximation (on site) |
| Jasmina Tekić-Andre E. Botha-Yury M. Shukrinov-Mohammad R. Kolahchi Chaos in the SFS ϕ_0 Josephson Junction (on site) | Satoshi Ebisawa Orbital Instability of Chaotic Laser Diode with Applied Pseudo-random Signal (on site) | Georgii Kalagov Kraichnan Flows and Langevin Dynamics: Scaling, Universality, Renormalization (on site) |
| Asgar Azari Non-chaotic Signal Transmission to Combat Chaotic Behaviours | Fumiyoshi Kuwashima-Mona Jarrahi-Semih Cakmakyapan-Osamu Morikawa-Takuya Shirao-Kazuyuki Iwao-Kazuyoshi Kurihara-Hideaki Kitahara-Takashi Furuya-Kenji Wada-Makoto Nakajima-Masahiko Tani Creation of New Features using Chaos-Stable and Wide range THz Wave using Laser Chaos | Nikita M. Lebedev Functional Renormalization Group Approach to the Nonlinear Diffusion Process (on site) |
| Asgar Azari Reversing Chaotic Phenomenon by Applying Chaotic Signals | Ken Umeno Chaotic Synchronization with Many Degrees of Freedom for Financial Crisis and THz Laser Generation | Eva Jurčišinová-Marián Jurčišin-Richard Remecky Persistence of Symmetry breaking in Kinematic Magnetohydrodynamic Turbulence (on site) |
| André E. Botha-W. Dednam Hyperchaos due to Explicit Symmetry breaking in Chaotic Magnetization Dynamics (on site) | Kazuyuki Yoshimura-Yusuke Doi-Tomoya Kitamura | L. Ts. Adzhemyan-A. Kudlis Stability of ϕ_4 -vector Model: Four-loop ϵ Expansion Study |

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| | Construction of Nonlinear Lattices Free from the Umklapp Process and Heat Transport | |
| Mauricio Díaz Levels of Chaoticity on Action groups and its Applications of Turing Machines | | |
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| 14:00-15:00 | | |
| LUNCH | | |
| 15:00 - 21:00 | | |
| Excursion to Knossos and the Heraklion Archeological Museum ending with a Greek "Meze" in a local Taverna | | |
| End of the 2nd Day | | |



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Thursday, 15.6.2023

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9:30-11:30

SCS5

Special and Contributed Sessions

| Room 1 | Room 2 | Room 3 |
|--|--|---|
| Power Units | Chaos Theory and Applications | Random networks - Solitons Chair: Victor Law |
| Chair: Jan-Olov Aidanpää | Chair: Y. Dimotikalis | Lequan Min A New Approach for Improving Pseudorandomness of Pseudorandom Sequences with Applications (virtual) |
| Jan-Olov Aidanpää Nonlinear Dynamics in Vertical Hydropower Generators with Damper Windings | Ruslans Babajans Study on Analog and Discrete Chaos Oscillators Synchronization (on site) | J. Leonel Rocha-S. Carvalho-B. Coimbra SIS and SIR Epidemic Dynamics in Random Contact Networks (virtual) |
| David Rondon-Jan-Olov Aidanpää-Rolf Gustavsson Effects of Nonlinear Magnetic Forces on the Dynamics of Hydropower Generators with Floating Rotor Rim | Sohrab Behnia-Roghayeh Pooshgan-Masumeh Garagozi Investigating Temperature Effect on the Electrical Conductivity of Graphene Lattice: Chaos Approach (on site) | Nikolaos Lazarides-Ioannis Kourakis Two-Wave Interactions, Vector Solitons and Freak Waves in Plasma Fluid Models (on site) |
| Gudeta B. Benti-Jan-Olov Aidanpää-Rolf. K. Gustavsson Rotor to Stator Contact in a Hydropower Unit with Squeeze-film Damper | Ismehene Chaouch-Anis Naanaa-Sadok ElAsmi Comparing Encryption and Decryption Message Using DES, AES and Chaos Algorithms to Secure Cloud Computing | V. L. Kalashnikov-A. Rudenkov-I. T. Sorokina Thermodynamics of Dissipative Solitons |
| Simon Pääjärvi Non-Linear Dynamics in Low-Damped Hydropower Rotor Systems (on site) | Darja Cirjulina Fundamental Frequency Impact on Vilnius Chaos Oscillator Dynamics (on site) | Shunji Kawamoto 3-D Discrete Vortex and Convection for the Lorenz System (on site) |
| Sara Moradi-Johan Anderson-Özgür D. Gürçan Random Phase Approximation in Turbulence, a Valid Assumption? (on site) | Valery Gaiko Limit Cycles, Chaos and Multistability in Polynomial Dynamical Systems | Vasily Lubashevskiy Entropy-Based Approaches of Edge Significance Quantification in Complex Networks: Detection of Link Vulnerabilities Using Static, Dynamic and Group-Focused Methods (virtual) |
| | Djehbal Hayet On some numerical performances for the pathwise | Malcolm David Lowe |

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| | stochastic elliptic partial differential equations | Chaos Theory and the Deep Structure of Meaning in Languages (virtual) |
| 11:30-12:00 | | |
| Coffee Break | | |
| 12:00-14:00 SCS6 Special and Contributed Sessions | | |
| <u>Room 1</u> | <u>Room 2</u> | <u>Room 3</u> |
| Dynamical Systems - Delay Chair: Lucas Illing CoChair: Michael Filippakis | Chaotic Dynamics Chair: E. Petraki | Special Session: Networks, Collective Behaviour and Applications |
| Lucas Illing-Kees Benkendorfer-Pierce Ryan-Andreas Amann Dynamics of an Electronic Delay Circuit Modeled by a Piecewise-linear Second-order Delay Differential Equation (on site) | Sungju Moon-Michael C. Wolfson Exploring the Chaotic Dynamics of Two Interacting Viral Strains: Agent-Based Modelling Approach (virtual) | co-organisers: Dr Thanos Manos and Dr Chris Antonopoulos |
| Vasiliy D. Pechuk-Nataliya V. Bondarenko-Evgeniy D. Pechuk-Tatyana S. Krasnopolskaya Chaos in Hydrodynamic Systems with Delay | Rabiaa Ouahabi A Comparative Study between Two Approaches to Controlling Chaotic Systems: Fixed-time Adaptive Control and Backstepping Control (virtual) | Raphaël Bergoin, Alessandro Torcini, Gustavo Deco, Mathias Quoy, and Gorka Zamora-López Inhibitory neurons control the consolidation of neural assemblies via adaptation to selective stimuli (virtual) |
| Aleksandr Shvets Influence of Delay Factors on the Limit Sets of Some Non-ideal Pendulum Systems | Fatih Ozkaynak-Omer Kaya A Robust Cryptographic Primitive Based on Chaotic System and Lava Lamp | Juliette Courson, Mathias Quoy, Yulia Timofeeva and Thanos Manos The role of onset location and edge resection in epileptic seizure propagation in mice brain: a computational study (virtual) |
| M. E. Filippakis-J. P. Zanchetta-M. N. Poulou Exponential Decay for a Klein-Gorhdon-Schrödinger System with Locally Distributed Damping (on site) | Dmitrijs Pikulins-Sergejs Umonovs-Sergejs Tjukovs-Juris Grizans On the Applicability of Vilnius Oscillator as the Configurable Chaotic Logic Gate (on site) | Yildirim Hüseyin and Chris G. Antonopoulos A statistical approach to infer connectivity in complex networks using the mutual information rate |
| E. Kandiran-Avadis S. Hacınliyan Generalized Normal Forms in Dynamical Systems near Equilibrium | Dmitrijs Pikulins-Aleksandrs Ipatovs-Sergejs Tjukovs-Daniils Surmacs-Juris Grizans Synchronization of Chaotic Buck Converters under Current Mode Control and its Applications (on site) | |
| Vasiliy D. Pechuk-Tatyana S. Krasnopolskaya-Evgeniy D. Pechuk A Universal Algorithm for Estimating the Lyapunov Exponent in a Dissipative Dynamical System | Nelson Poumaëre-Benoît Pier-Florence Raynal Chaotic Advection in the Saturated Pulsatile Plane Poiseuille Flow (on site) | |
| V. Grytsay | Nabil Sahraoui | |

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| Spectral Analysis and Invariant Measure in Studying the Dynamics of a Metabolic Process in the glycolysis-gluconeogenesis System | Optimization of the Management of the Quality of Living Environment Using the Chaotic Approach | |
| Spyridon A. Kontos and George S. Atsalakis Predicting Monthly Mortality Rates in Greece (1990-2020) using the ANFIS model (on site) | Sabiha Aklouche-Benouaguef-Fatma Zohra Aklouche-Adjal Saad-Belkacem Zeghmati Evolution to Chaotic Natural Convection in Inclined Rectangular Cavity (virtual) | |
| 14:00-15:00 Lunch | | |
| 15:00-15:40 Room 1 (PS4) Plenary Session Chair: Christos H Skiadas Speaker: Leszek Sirko <i>Institute of Physics, Polish Academy of Sciences, Warsaw, Poland</i> | | |
| Title: Investigations of Microwave Networks with Symplectic, Unitary and Orthogonal Symmetries (on site) | | |
| 15:40-16:00 Coffee Break | | |
| 16:00-18:00 SCS7 Special and Contributed Sessions | | |
| Room 1 | Room 2 | Room 3 |
| Models and Chaos | Chaotic cases | Special Session: Advances in Chaos Theory and Dynamical Systems |
| | | co-organisers: Dr Thanos Manos and Dr Chris Antonopoulos |
| Sónia H. Marques Metamodelling with the Multi-Dimensional Hermite Polynomial Chaos Expansion (virtual) | M.M. Khoshyaran-J.P. Lebacque Complex Dynamics Generated by Simultaneous Route and Departure Time Choice in-Transportation Networks (virtual) | Helen Christodoulidi Lyapunov Exponents in Models with Long-Range Interactions |
| Marina Pireddu A Topological Proof of Chaos via Linked Twist Maps for two Evolutionary Game Theoretic Models (virtual) | Berc Deruni-Engin Kandiran-Ali Cihan Keles-Ergun Eray Akkaya Analysis and Control of Chaos in Simple 3D Autonomous System with Exponential Nonlinearity | Edson Denis Leonel Characterization of a Continuous Phase Transition in a Chaotic System (virtual) |
| Nektarios Gavrilakis-Christos Floros Global Uncertainties, Volatility Return and Dependence Str(on site)GARCH and Copula Approaches (on site) | Ana Maria Guedes Chaos in the Iberian Electricity Market - Characterization and Prediction with Nonlinear Methods | Hadi Susanto Dynamics prediction of higher-order rogue waves using Reservoir Computing (virtual) |
| Haidar Sabbagh Core Expansion and Spiral Breakup in Oscillatory Recovering Media (virtual) | Irma Hacinliyan A Higher-Order Septic Nonlinear Model for Transverse Waves in a Generalized Elastic Medium (on site) | Zulkarnain Zulkarnain, Hadi Susanto, Chris G. Antonopoulos Localisation of energy in the disordered Fermi-Pasta-Ulam-Tsingou lattices and its chaotic behaviour (virtual) |

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| <p>Evangelia N. Petraki Defining ontologies within the FDB model (on site)</p> | <p>Serhii Haliuk-Mykola Khobzei- Vladyslav Tkach-Petro Ivanyuk- Dmytro Vovchuk Deterministic Chaotic Behaviour of Coupled Simple Nonlinear Systems for Time and Spatial Modulation</p> | |
| <p>Maria Tantoula-Konstantinos Gkillas-Dimitrios Vortelinos- Christos Floros Modeling and Forecasting Stochastic Volatility of Cryptocurrencies (on site)</p> | <p>Yury A. Kosevich-Irina P. Koroleva Interplay of Nonlinearity and Interference and New Nonlinear Phonon Transmission Resonance in Two-Path Atomic-Scale Junction</p> | |
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20:00 - 24:00

Farewell Dinner
Cretan food, music and dances

End of the 3rd Day



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Friday, 16.6.2023

TIME ZONE: [EEST — Eastern European Summer Time](#)

10:00-11:30

SCS8

Special and Contributed Sessions

| Room 1 | Room 2 | Room 3 |
|--|---|---|
| Models - Information - Lasers | Theory | Chaotic Dynamics |
| <p>Lidia Dzierzbicka-Głowacka-Maciej Janecki-Dawid Dybowski-Artur Nowicki Digital Information System for Polish Maritime Areas (on site)</p> | <p>Dimtrios G. Christakis Chaotic Relativity Times Phaotic Discretion (on site)</p> | <p>Tatiana F. Filippova Dynamics of Multivalued States of a Dynamical System with Uncertainty: Problems of Control Synthesis (virtual)</p> |
| <p>Georges Sarafopoulos-Kosmas Papadopoulos-Despoina Terzopoulou Dynamics of a Cournot Game with Differentiated Goods and Asymmetric Information (virtual)</p> | <p>Anatolij K. Prykarpatski-Alexandre A. Balinsky-Radoslaw Kycia On the Two-dimensional Boole Type Mapping Ergodicity</p> | <p>Evelina V. Prozorova Investigation of the Effect of Moment on Processes near the Surface of a Crystalline Body Based on a Macromodel</p> |
| <p>Larissa Svirina Complicated Oscillations in Anisotropic-cavity Lasers</p> | <p>Alexander Valyaev Increasing of Science Efficiency</p> | |
| <p>Valeriy S. Abramov Relativistic Superjet, Tetraneutrons and Higgs Boson in the Quark-gluon Model (virtual)</p> | <p>Vyacheslav M. Somsikov Features of the Principles of the Physics of Evolution (on site)</p> | |
| <p>Alexander M. Krot Development of the Analytical Models of Protoplanetary Formation in Extrasolar Systems</p> | | |

11:30 - 12:00

Coffee Break

12:00-14:00

SCS9

Special and Contributed Sessions

| Room 1 | Room 2 | Room 3 |
|---|------------------------------|--|
| Chaos Applications and Forecasting | Dynamics and Fractals | Biology and Chaos Chair: Victor Law |

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| | | Tamar Kanimian-Dalia Ezzeddine-Rabih Sultan Chemical Analogs of Voronoi Diagrams (on site) |
| Jenny Magnes-Katherine Canavan-Raffaella Zanetti-Susannah Zhang Multi-Channel Measurement of Largest Lyapunov Exponents using Dynamic Optical Diffraction (on site) | Alexandru Tudorache-Rodica Luca Tudorache On a System of Fractional Differential Equations with p -Laplacian Operators and Nonlocal Coupled Boundary Conditions (virtual) | Yangyang Yu-Yongchen Fan-Ying Wu Energy Failure after Ischemic Stroke Accounts for Epileptic Seizures |
| Olga P. Abramova Split Dislocation in a Fractal Coupled Structure (virtual) | Ivan G. Grabar-Yuri O. Kubrak Synthesis of Multifractals by Brownian Dynamics of a Point in a Field of N Central Forces (virtual) | Susannah G. Zhang-Raffaella F. Zanetti-Katherine Canavan-Jenny Magnes Visualizing and Quantizing the Temporal Evolution of <i>C. Elegans</i> Locomotion through Recurrences (on site) |
| Edmar Soria A Theoretical Dynamics Framework for Space-Timbre in Multichannel Electroacoustic Music | Didier Samayoa Ochoa-Lucero Damián Adame-Andriy Kryvko Euler–Bernoulli Bending Principle for Self-Similar Beams in Fractal Continuum | Igor E. Kanunikov Relationship between Recurrent EEG Parameters and Depression |
| Georgia Zournatzidou-Christos Floros-Konstantinos Gkillas Forecasting Realized Risk Measures: New Evidence (on site) | George Vostrov-Andrii Khrirenko-Maksym Stavratii Nonlinear Congruent Dynamical Systems: Fractal and Chaotic Components | Victor J Law-Denis P Dowling Revisiting ‘Non-thermal’ Batch Microwave Oven Microwave Oven Inactivation of Microorganisms (on site) |
| Reza Malek-Madani An Analytical and Computational Study of the Paraxial Wave Equation (on site) | Paniveni Udayashankar Supergranulation as a Dynamic Phenomenon | Alexander Spirov Co-Evolution of Gene Networks and Genomic Parasites |
| Soumyadip GHOSH, Yingdong LU, Tomasz NOWICKI(presenter) all IBM Research Hamiltonian Monte Carlo, hitting the target using random auxiliaries | Siavash H. Sohrab Invariant Boltzmann Statistical Mechanics and the Physical Foundations of Quantum Mechanics, Quantum Gravity, and Quantum Cosmology (on site) | Yanmei Kang-Ziheng Xu A Noise Facilitated Improvement of Spiking Perceptron Algorithms |
| Wei Paxson-Bo-Wen Shen Application of the KdV-SIR Equation for COVID-19 Data Analysis | | |
| 14:00- 15:00 LUNCH | | |
| <p>15:00-15:40 Room 1 (PS5) Plenary Session Chair: Victor Law Speaker: Wieslaw M. Macek</p> <p>¹<i>Institute of Physical Sciences, Faculty of Mathematics and Natural Sciences, Cardinal Stefan Wyszyński University, Warsaw, Poland</i> ²<i>Space Research Centre, Polish Academy of Sciences, Warsaw, Poland</i></p> <p>Title: Fokker-Planck Statistical Analysis of Turbulence on Kinetic Scales (virtual)</p> | | |
| 15:40- 16:00 Coffee Break | | |

16:00-16:40

Plenary Session

[Room 1](#) (PS6)

Chair: Christos H Skiadas

Speaker: **Bo-Wen Shen**

Department of Mathematics and Statistics, San Diego State, U.S.

Title: Attractor Coexistence, Butterfly Effects, and Chaos Theory (ABC): A Review of Lorenz Models and a Generalized Lorenz Model

16:40-17:00

[Room 1](#)

Closing Ceremony

End of the Conference

Meeting information

Link for Opening Ceremony, Closing Ceremony, Plenary Sessions and Room 1

Meeting link: <https://isast.webex.com/isast/j.php?MTID=m48e4d06d6a4ad05a98caee4387e06080>

Meeting number: 2744 094 4468

Password: chaos2023

Host key: 260442

Join by video system: Dial 27440944468@isast.webex.com. You can also dial 62.109.219.4 and enter your meeting number.

Join by phone: +44-20-7660-8149 United Kingdom Toll, Access code: 2744 094 4468, Host PIN: 6032

Link for Room 2

Meeting link: <https://isast.webex.com/isast/j.php?MTID=m0ef7d2afcd8fdb47baa967973149d899>

Meeting number: 2743 240 8740

Password: chaos2023

Host key: 394750

Join by video system: Dial 27432408740@isast.webex.com. You can also dial 62.109.219.4 and enter your meeting number.

Join by phone: +44-20-7660-8149 United Kingdom Toll, Access code: 2743 240 8740, Host PIN: 6032

Link for Room 3

Meeting link: <https://isast.webex.com/isast/j.php?MTID=m36a554f0d5327c93c48bb9660010dae2>

Meeting number: 2744 137 5255

Password: chaos2023

Host key: 187137

Join by video system: Dial 27441375255@isast.webex.com. You can also dial 62.109.219.4 and enter your meeting number.

Join by phone: +44-20-7660-8149 United Kingdom Toll, Access code: 2744 137 5255, Host PIN: 6032

Social Events

Half Day Excursion

When: Wednesday, 14 June 2023

Departure time: 15:00 pm

Meeting point: Conference venue

Route: Guided tour to Knossos archaeological site, Archaeological Museum of Heraklion, light dinner

Conference Dinner

When: Thursday, 15 June 2023

Departure time: 20:00

Duration 20:00- 24:00

Meeting point and drop off: In front of the Archaeological Museum of Heraklion, Eleftheria sq.

Venue: Kalikakis estate, Episkopi Village, Heraklion

Menu

Starters

Cretan cream cheese

Traditional vegetable pie

Cretan spinach pie

Potatoes baked with cheese

Penne with mushrooms

Cretan salad

Main course

1st Boiled beef and traditional rice (pilafi)

2nd Baked lamb (ofto) with potatoes

Alternatively, Vegetarian meal to be arranged.

Desert

Local cheese pies with honey.

Cretan wine, refreshments, water

Cretan music and dancers will accompany the event.

Practical Information

Basics

Time (GMT) +2 hours

Power 220v 50AC

Emergencies call 100

Top speed 100-120 km/h

Getting there

By Air.

The airport of Heraklion is the biggest in Crete. Holiday charter flights arrive at Heraklion and Chania from many European airports. There are daily flights from Athens and Thessaloniki to Heraklion and Chania and also a daily flight to Rhodes.

N. Kazantzakis airport 0030 2810 228402

Airport Police Station 0030 2810 246720

By Ferry.

Regular ferry services run from Piraeus (Athens) to ports at Heraklion and Chania. Ferries usually leave in the evening and arrive the following morning. The main ferry firms serving Crete are:

ANEK Lines, Information: <https://www.anek.gr/en/>

Piraeus 0030 210 4197510, pr-pir@anek.gr

Heraklion, 0030 2810 222481-2, ira-ag@anek.gr

Minoan Lines, Information: <https://www.minoan.gr/>

Heraklion, 0030 2810 399899, info@minoan.gr

SeaJets, Information: <https://www.seajets.com/>

Piraeus 0030 210 7107710, reservations.dpt@seajets.gr, info@seajets.gr.

Port Police 108/ 0030 2810 244912

Roads

Roads are good but Crete is a very large island. A major expressway runs the length of the island east/west while roads going north/south are mostly single carriageway and snake over impressive mountains and through dramatic gorges.

The main highway runs the length of Crete following the north coast. It's not dual carriageway but it is wide, well maintained and well signposted, providing easy access to the north coast beach resorts. Roads over the mountains are generally excellent but the winding roads often mean journey times are longer than expected from reading a map.

Road Help ELPA (OVELPA) 104

Road Help Express Service 154

Road Help Hellas Service 1057

Road Help Interamerican 168

Road Traffic Police 0030 2810 274080

Transportation in the city and around

City Buses (blue) serving the city of Heraklion from early morning until late evening. Starting from the port city services operated in the archaeological site of Knossos. Information: 2810-226065 and 220795. Web: <http://astiko-irakleiou.gr/>

Intercity Buses (green) connecting Heraklion with all the counties of Crete for easy movement of residents and visitors. KTEL runs regular buses between Rethymno and Chania and there are services to many inland villages. Taxis are common and relatively cheap. Fares are regulated and metered.

Web: <http://www.ktelherlas.gr>

Information 0030 2810 246534, info@ktelherlas.gr , webinfo@ktelherlas.gr

Taxi services in Heraklion.

www.crete-taxi.gr

0030 6970021970, 0030 6945027933

<https://www.herakliontaxi.com/en/index.html>,

0030 2814 003084, 0306945774937

<https://gettransfer.com/en>

www.cretetaxi.net

0030 697 002 1970

crete-heraklion-kania.taxi

0030 694 491 5683

Useful telephones

Police 100

Ambulance 166 / 0030 2810 222222

Coast Guard 108

Forest Fire Center 191

Fire Department 199

Tourist police 171/ 0030 2810 274046

Municipal Police 0030 2810 334181-5

Municipality of Heraklion 0030 2813 409000

Crete Region Tourism Division 0030 2810 246100

Post Office, Daskalogianni square, 0030 2810 234468

Hospitals

Regional Academic Hospital- PAGNH Tel. 0030 2813 402111

Venizeleio General Hospital Tel. 0030 2813 408000

Discover Heraklion, Crete¹

The capital of Crete is a modern city, fourth in importance in Greece. Economic and cultural hub of the island, it is one of the most popular tourist resorts in Greece.



According to mythology, Zeus brought Europa, the beautiful princess, here after kidnapping her from the court of the Phoenician king. Minos came from the union of Zeus with Europa.

A visit to its important Archaeological Museum which houses the largest collection of Minoan art is mandatory. In addition, the Venetian rule of the island bequeathed to the city of Heraklion the Castle of Koules, a majestic building overlooking the port and the nearby Arsenal.

A few kilometers from Heraklion are four of the most important Minoan sites on the island: Knossos, home to the famous palace that housed Minos and the Minotaur, Phaistos, Malia and Agia Triada.

Also, very popular are the splendid beaches of the southern coast such as those near Metala, hidden among the tuff caves.

Geography

Endless dreamy beaches, Venetian old towns, castles and palm groves, wild gorges and unique archaeological sites, cosmopolitan resorts and traditional recipes that have never been left in the closet.

Nature

The Cretan nature is a treasure with thousands of different landscapes that you must discover and that takes time. The highest mountain of Crete has taken root deep in the soul of the Cretans. Countless local folk songs have been sung about its wild peaks, the rugged Cretans living in its villages, the way of life in the mountain pastures, the genuine Cretan soul that Psiloritis represents. Here, however, the past and the future coincide: in the Idea Cave of Psiloritis, Zeus himself found refuge and was raised, according to mythology. North of Heraklion is the small island of Dia, which has been declared a wild goat sanctuary.

Climate

Although the island straddles the two climatic zones of both the Mediterranean and North African its climate is more typically Mediterranean being classified as temperate.

The summer temperatures are classically dry and hot with average temperatures between high 20s to low 30s Celsius but can reach the high 30s to mid-40s and, depending on closeness to the sea, the humidity can be high in summertime.

¹ Copyright 2021 [Crete travel guide](#)

Winters are usually fairly mild although, in the mountainous regions, snow is common and



temperatures can drop to abnormally low levels.

Snow can stay on the tops of the highest mountains for the whole year but it is very rare to have snow in the low-lying regions. The southern coast of the island which includes the Mesara Plain and the Asterousia Mountain range falls within the North African climatic zone and consequently has considerably more sun and higher temperatures all year round.

Museums and Cultural sites

The archaeological site of Knossos and the archaeological site of Heraklion are among the most important institutions in the world and are worth seeing at least once in a lifetime. Festus, Gortyna, Agia Triada and many others make cultural visits interesting and varied. Added to this are historic centers, monuments, churches and monasteries rich in history and charm. Traditional color in the unchanged villages of the hinterland for years where the sui generis Cretans respectfully maintain their traditions and their characteristic Cretan costume touches.

The Venetian walls of Heraklion

The mighty 13th century Venetian walls enclose the old port of Heraklion, offering the best view of the small fortified fortress of Koule. Paying more attention to this building you will see the Lion of St. Mark carved in the stone structure, above the main gate. This pattern of Venetian power is found in many monuments in northern Italy and the Eastern Mediterranean.



Loggia.²

The *Loggia* is one of the most important Venetian buildings in [Crete](#). It was a kind of gentleman's club, where the rich nobles and lords gathered. The building was built after 1541 probably with designs by *Michel Sammicheliin* Palladian style. It was then rebuilt in its current form after 1628 by *Francisco Morosini*. *Loggia is the city hall of Heraklion today.*

Basilica Di San Marco.³

The Basilica of Saint Mark also known as Hagios Markos (Greek: Άγιος Μάρκος), is a former Roman Catholic church in the center of the city of Heraklion, Crete, in the Eleftheriou Venizelou Square. It was built during the Venetian rule of the island in 1239, primarily used by the local lords and officials of the island. After the Ottoman conquest of Crete in 1669, it was converted into a mosque with the name Defterdar Ahmet Pasha Mosque (Greek: Δεφτερδάρ Αχμèt Πασά Τζαμι, Turkish: Defterdar Ahmet Paşa Camii), and remained so until 1915. The building was restored after 1956 and ever since functions as a public art gallery.[1] It is one of the few Roman Catholic churches still

² [Venetian Loggia - Heraklion Town Hall - Crete Guide \(destinationcrete.gr\)](#)

³ [Saint Mark's Basilica, Heraklion - Wikipedia](#)

standing in Cretan cities and towns.[2] Architecturally-wise it is a three-aisled basilica church with an elevated central nave. It has a portico in its entrance in the western façade.

Morosini fountain/ Lions Square⁴

One of the most brilliant monuments of the city of Heraklion. This is an impressive sculptural piece which was made in 1628, by then Provveditore Generale (Superintendent) Francesco Morosini and the engineers Zorzi Corner, Raffaello Monnani and Francesco Basilicata. Morosini was also the one who supervised and designed the construction of the aqueduct that led the water from the springs of the Archanioti gorge to the centre of Heraklion. The fountain supplied the city with more than 1,000 barrels of water a day and was named after him. The construction lasted more than 14 months and the fountain was inaugurated on April 25, 1628, on the celebration of Saint Mark, patron saint of Venice. Confusingly, the official name of Lions Square is, "Eleftheriou Venizelou Square" after the Prime Minister of Greece and leading figure in the struggles of Crete for the union with Greece.



Rocca al Mare or Koules Castle⁵

Two fortresses were built; in different times the current Koules, which dominates the edge of the harbor of Heraklion, and a smaller one just opposite of it, which was demolished in the early 20th century to improve the operation of the port. The small fortress built by the Venetians, for supplemental defense of Candia, was named "Rocca al Mare" (Sea Fortress). After the invention of gunpowder, the Venetians decided to create a larger building that could meet their needs. The construction was completed in 1540. The building had two floors, with 26 rooms for various uses, including prisons. The Turks, who occupied the island in 1669 renamed it 'Koules' and decided to continue its construction. It is now preserved in a very good condition and is used for cultural events.



Municipal Art Gallery

The Municipal Art Gallery include in its possession a rich Collection of Works of Art which capture the evolution of artistic creation from the beginning of its foundation in Crete, to its most recent expressions. The original core of the works was created in parallel with the founding of the Municipality of Heraklion, enriched with donations from various artists, including works by renowned, recognized artists (Fanourakis, Markogiannakis, Tsarouchis, Vassiliou, Fasianos etc) to which a large market was added. Cretan painter, Domenikos Theotokopoulos, "The Baptism of Christ". Besides, Heraklion, during the Cretan Renaissance, created the famous school of Cretan

⁴ [Morosini Fountain \(Lions Square\) - Heraklion - Crete Guide \(destinationcrete.gr\)](#)

⁵ [Koules, Rocca a Mare or Castello a Mare, at the port of Heraklion, Crete \(landofexperiences.gr\)](#)

Hagiography, which gave birth to worthy children, such as Dominikos Theotokopoulos, Damaskinos and so many others.

<http://www.heraklionartgallery.gr/> Information: 0030 2813 409454

Heraklion Archaeological Museum

The Herakleion Archaeological Museum is one of the largest and most important museums in Greece, and among the most important museums in Europe. It houses representative artefacts from all the periods of Cretan prehistory and history, covering a chronological span of over 5,500 years from the Neolithic period to Roman times. The singularly important Minoan collection contains unique examples of Minoan art, many of them true masterpieces. The Herakleion Museum is rightly considered as the museum of Minoan culture par excellence worldwide.

The museum, located in the town centre, was built between 1937 and 1940 by architect Patroklos Karantinos on a site previously occupied by the Roman Catholic monastery of Saint-Francis which was destroyed by earthquake in 1856. The museum's antiseismic building is an important example of modernist architecture and was awarded a Bauhaus commendation. The colours and construction materials, such as the veined polychrome marbles, recall certain Minoan wall-paintings which imitate marble revetment. The two-storeyed building has 27 galleries, a gallery for audio-visual displays, extensive modern laboratories, a cloakroom, a cafeteria and a museum shop that sells museum copies, books, postcards and slides.

The Herakleion Archaeological Museum is a Special Regional Service of the Ministry of Culture and its purpose is to acquire, safeguard, conserve, record, study, publish, display and promote Cretan artefacts from the Prehistoric to the Late Roman periods. The museum organizes temporary exhibitions in Greece and abroad, collaborates with scientific and scholarly institutions, and houses a variety of cultural events.

Information: 0030 2810 279000

The Historical Museum of Crete

The Museum was founded by the Society of Cretan Historical Studies in 1953, housed in the Andreas and Maria Kalokerinos. It's aim is to preserve and showcase the cultural heritage of Crete from early Byzantine times to the modern era. This aim has been achieved gradually, by the collection, purchase and donation of artefacts, together with artefacts on long term loan from the Ministry of Culture. The HMC now offers a composite view of Cretan history and art from the early Christian centuries to the 20th century. Temporary exhibitions cover a wide span, ranging from Byzantine to modern art, showcasing key literary figures in Greece (Elytis, Kazantzakis), and presenting major historical events from the late 19th century to the Second World War. At the same time, our educational programmes are constantly being enriched. Offered free of charge, they are a creative source of knowledge relating to the Museum's permanent collections and temporary exhibitions. Lectures, symposia, film shows and book presentations held in the amphitheatre add to activities at the Historical Museum of Crete, rendering it an outgoing, multi-faceted cultural organization.

www.historical-museum.gr



Historical temples

Churches of the Byzantine time, of the Venetian period, as well as later ones are still preserved today, in different parts of the city, each one having its own history, denoting the deep religious belief of the people of Heraklion during their long history. Some of the churches, like the church of St. Marc is used today as an exhibition place, while in the church of St. Aikaterini of Sinai, art works of the Cretan school of iconography are exhibited along with ecclesiastical vessels, books, sacerdotal vestments and frescoes.

Byzantine Museum of St. Catherine

Wall paintings and frescoes. Artistic evolution in Crete ceased abruptly after the Venetian conquest in 1211, since the island became isolated from the artistic centers of the Byzantine Empire. In the period that followed local artisans remained focused on the archetypes of the past. Under these circumstances, the archaic and usually provincial character of the Cretan wall-painting of the first period of the Venetian occupation is easily explicable. This style survived until the third decade of the 14th c., when the Cretan painting knew a new revival under the influence of the Palaiologan Renaissance.

The gradual penetration of this new tendency and its further evolution, eased by the immigration



of Constantinopolitan artisans to Crete due to the Ottoman threat, led to an accession of the artistic level and formed the specific character of the artistic style that was described under the term "Cretan School of Painting". This high quality painting is encountered in a series of churches, usually related to educated clergymen or wealthy donors, from the end of the 14th and the beginning of the 15th c. onwards.

Icon painting in Crete. The adoption of the wooden iconostasis, which replaced the Byzantine marble templon, favored the production of icons around the end of the 14th c. The new artistic air brought to Crete by the Constantinopolitan artists that immigrated to Candia and the influence of the Western art, which was favored by the Venetian presence in the island, the trade and the growth of a rich and well educated bourgeoisie, which supported the Fine Arts, helped the emergence of great painters such as Angelos Akotantos, Andreas Rizzo, Theophanes, Michael Damaskenos and Dominikos Theotokopoulos (El Greco) as well as the creation of a specific artistic language in the icon-painting, which was described under the term "Cretan School of Painting".

Architecture and Sculpture. When Crete was conquered in 1211, Venice established in Candia (Heraklion) the administrative center of the island. The importance the Venetians gave to the city becomes evident by the fact that Candia was the first town they conquered and the last they abandoned to the



hands of the Ottomans four hundred and fifty years later (1669), after a fierce resistance that lasted 21 years. The impressive economical, demographic and urban growth turned the small provincial Byzantine port into one of the most important trade centers of the Mediterranean.

The predominance of the Venetian Democracy in Crete was not efficient enough to cut off the strong emotional bond between the locals and the Byzantine Empire, the only representative of the

orthodoxy. The consistent efforts of Venice to enforce restrictions in religious matters amplified this anticipation. Nevertheless, the local society could not stay unaffected by the western cultural innovations imported by the conquerors.

After almost two centuries of revolution movements, the Cretans came to realize that the Venetian occupation was not to be defeated. The peaceful period that followed the “rebellion of St. Titus” (1363-1366) allowed the two sides to approach each other. Nevertheless, the persistence of Venice to impose a union between the Orthodox and the Catholic Church soon led into a new agitation. The consciousness of the common origin, language and religious dogma between the Cretans and the rest of the byzantine populations reinforced their resistance towards the assimilation.

The ideological guidance of Constantinople ceased to exist with the Fall of the Byzantine Empire in 1453. Though the memories stayed alive, soon it became obvious that Venetians and Cretans had to stand equally against the common enemy, the threat of the Ottoman Empire. Local population felt for the first time secure under the flag of Saint Marcus. Leaving behind all the differences, they managed to mingle western renovations with the byzantine tradition in a creative amalgam that was expressed in a unique way through the Cretan art and architecture.

www.iamk.gr.

Information: 0030 2810 336316

Natural History Museum of Crete, University of Crete

Knossou Ave., P.O. Box 2208, 71409 Heraklion

Information: 0030 2810-324366, sec@nhmc.uoc.gr

Exhibition Halls of Natural History Museum of Crete, University of Crete

Sofokli Venizelou Avenue Heraklion

Information: 0030 2810 282740, 0030 2810 393630, info@nhmc.uoc.gr

<https://www.nhmc.uoc.gr/en/museum/infrastructure/library>