

European Conference on Iteration Theory 2026

June 08-12, 2026; Farsund, Norway

Program

Book of Abstracts

UiA School of Business and Law

ECIT

Monday 08.06.2026		
16:00-18:30	**Arrival, Check-In**	
19:00-21:00	**Welcome Dinner**	

Tuesday 09.06.2026		
07:00-08:30	**Breakfast**	
09:00-09:30	**Opening**	
S1	**Chair Person: Saber Elaydi**	
09:30-10:00	Fractional iterates of homographic functions via Schröder's equation	Witold Jarczyk
10:00-10:30	When are local properties of solutions of iterative functional equations actually global?	Paweł Pasteczka
10:30-11:00	**Coffee break**	
S2	**Chair Person: Witold Jarczyk**	
11:00-11:30	On generalized fractional maps	Mark Edelman
11:30-12:15	Global Stability of SIR model using nullclines	Saber Elaydi
12:30-14:00	**Lunch**	
S3	**Chair Person: Peter Raith**	
14:00-14:30	Backward Recurrence, Limit Sets, and Minimality	Veronika Rýžová
14:30-15:30	Transitivity in Mahavier dynamical systems	Michaela Záškolná
15:00-15:30	Integral version of the MW operator	Janusz Morawiec
15:30-16:00	**Coffee break**	
16:00-19:00	Free research	
19:00-21:00	**Dinner**	

Wednesday 10.06.2026		
07:00-08:30	**Breakfast**	
S4	**Chair Person: Anastasiia Panchuk**	
09:00-09:30	Chaotic or weird? Exploring a 2D discontinuous map arising in an economic application	Iryna Sushko
09:30-10:00	Effects of a two-tier transaction tax system in speculative markets	Frank Westerhoff
10:00-10:30	On the behavior of market makers and the emergence of weird quasiperiodic attractors in financial markets	Davide Radi
10:30-11:00	**Coffee break**	
S5	**Chair Person: Davide Radi**	
11:00-11:30	On a new class of maps possessing weird quasiperiodic attractors (WQAs)	Laura Gardini
11:30-12:00	Green Transformation and Fiscal Policy in a Two-Sector OLG Model with Production Externalities	Jan Wenzelburger
12:00-12:30	Convex semi-continuous solutions of polynomial-like iterative equations	Chaitanya Gopalakrishna
12:30-14:00	**Lunch**	
S6	**Chair Person: Frank Westerhoff**	
14:00-14:30	FX-constrained growth: Fundamentalists, contrarians, trend-extrapolators and the dynamic trade-multiplier	Marwil Dávila Fernández
14:30-15:30	A small scale model reproducing volatility clustering in financial markets	Tatyana Perevalova
15:00-15:30	Bifurcation structures for a 1D piecewise linear map with two kink points and two discontinuities	Anastasiia Panchuk
15:30-16:00	**Coffee break**	
16:00-19:00	Free research	
19:00-21:00	**Dinner**	

Thursday 11.06.2026		
07:00-08:30	**Breakfast**	
S7	**Chair Person: Ludwig Reich**	
09:00-09:30	Continuity of the topological pressure for piecewise monotonic maps under C1-perturbations	Peter Raith
09:30-10:00	On the transfer operators for position dependent random maps	Farida Hmissi
10:00-10:30	On the Lebesgue Decomposition of Additive Kernels	Mohamed Hmissi
10:30-11:00	**Coffee break**	
S8	**Chair Person: Wolfgang Förg-Rob**	
11:00-11:30	Persistence and extinction in a stochastic evolutionary Beverton-Holt model	Eddy Kwessi
11:30-12:00	Approximating basin boundaries using a support vector machines and differential equations	Trygve Kastberg Nilssen
12:00-12:30	**Closing**	
12:30-14:00	**Lunch**	
14:30-17:30	Coastal culture cruise with privateering history, 3 hour sailing with departure from Farsund Resort	
19:00-21:00	**Dinner**	

Friday 12.06.2026		
08:00-10:00	**Breakfast**	
10:00-11:00	**Check-Out**	
11:00	**Departure**	

Fractional iterates of homographic functions via Schröder's equation

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Abstract

This is a joint work with Steven Finch and Justyna Jarczyk.

Let $f : \mathbb{C} \cup \{\infty\} \to \mathbb{C} \cup \{\infty\}$ be any Möbius transformation given by

$$f(z) = \begin{cases} \frac{az+b}{cz+d}, & \text{when} \quad z \in \mathbb{C} \setminus \left\{-\frac{d}{c}\right\}, \\ \infty, & \text{when} \quad z = -\frac{d}{c}, \\ \frac{a}{c}, & \text{when} \quad z = \infty, \end{cases}$$

where $a, b, c, d \in \mathbb{C}$ are such that $c \neq 0$ and $ad - bc \neq 0$. Using a recurrent method we find a simple explicit form of iterates of f. Then, in a neighbourhood of the attractive fixed point ξ of f, we determine effective formulas for solutions σ of the Schröder equation

$$\sigma(f(z)) = f'(\xi)\sigma(z)$$

which are differentiable at ξ. Using this we can find the form of fractional iterates (i.e. iterative roots) of f and embed f into a semiflow.

When are local properties of solutions of iterative functional equations actually global?

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Abstract

We study the extendability of properties of solutions of simultaneous iterative equations. We prove that, under some additional assumptions, if the solution of

$$\varphi(f_t(x)) = g_t(x, \varphi(x)), \quad t \in T, \tag{E}$$

exists, then it is not only unique, but its local properties turn out to be actually global. More precisely, we show that, in the case when the indicated function solves the simultaneous equations, each local property can be propagated to the entire domain.

Systems of the form (E) have been intensively studied in last 70 years, starting from G. de Rham [1], [2] and ending with W. Jarczyk and P. Pasteczka [3] and [4].

These results were obtained joinly with Witold Jarczyk.

References

[1] G. de Rham, "Sur certaines équations fonctionnelles", *Ecole Polytechnique de l'Université de Lausanne.* Centenaire 1853–1953, pp. 95–97, École Polytechn. Lausanne (1953).

[2] G. de Rham, "Sur quelques courbes définies par des équations fonctionnelles", *Univ. e Politec. Torino. Rend. Sem. Mat.* 16 (1956/57), 101–113.

[3] W. Jarczyk, P. Pasteczka, "Simultaneous difference equations on a restricted domain", Aequat. Math. 93 (2019), 239-246.

[4] W. Jarczyk, P. Pasteczka, "Extension theorem for simultaneous q-difference equations and some its consequences", Results Math. 79 (2024), Paper No. 262.

On generalized fractional maps

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Abstract

Fractional calculus has a rich history which is associated with the names of many great mathematicians. Its multiple applications in various areas of science and engineering stimulated the recent increase in interest in fractional calculus. Fractional maps which are defined as the discreet Volterra equations of a convolution type with diverging kernels and absolutely converging first differences of kernels [1, 2, 3] are suitable for the investigation of general properties of fractional dynamics. We derived asymptotic stability [4] conditions and equations that define asymptotically periodic and bifurcation points in generalized fractional maps [5, 6]. We use those equations to draw bifurcation diagrams of the fractional difference logistic map and to show that the fractional Feigenbaum δ may exist and have the same value as the regular Feigenbaum δ. Our results may be applied to investigate variable order maps and dissipative systems like the Hénon or the Lozi maps.

References

[1] M. Edelman "Cycles in asymptotically stable and chaotic fractional maps" *Nonlin. Dyn.* **104** (2021), 2829–2841

[2] M. Edelman, A.B. Helman "Asymptotic cycles in fractional maps of arbitrary positive orders" *Fract. Calc. Appl. Anal.* **25** (2022), 181–206

[3] M. Edelman "Asymptotic cycles in fractional generalizations of multidimensional maps" *Fract. Calc. Appl. Anal.* **28** (2025), 24–37

[4] M. Edelman "Stability of fixed points in generalized fractional maps of the orders $0 < \alpha < 1$" *Nonlin. Dyn.* **111** (2023), 10247–10254

[5] M. Edelman, A.B. Helman, R. Smidtaite "Bifurcations and transition to chaos in generalized fractional maps of the orders $0 < \alpha < 1$" *Chaos* **33** (2023), 063123

[6] M. Edelman "Asymptotically periodic and bifurcation points in fractional difference maps" *Fractal Fract.* **9** (2025), 231

Global Stability of SIR model using nullclines

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Abstract

We consider a cooperative discrete SIR model [1]. An example is a respiratory infections with partial immunity, influenza, pertussis—waning immunity and birth inflow sustain susceptibles, yielding monotone epidemic trajectories without oscillations. In this model, $\det(J) < 0$ which implies the map is orientation-reversing, giving a globally attracting endemic equilibrium rather than oscillation. The most challenging problem in general discret dynamical systems is to prove global stability of the interior equilibrium. In this talk, we develop a new method, the nullcline method, to prove global stability of the endemic equilibrium.

References

[1] S. Elaydi and J. Cushing, Discrete Mathematical Models in Population Biology, Sprinnger, 2025

Backward Recurrence, Limit Sets, and Minimality

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Abstract

The notion of recurrence (introduced in [1]) plays a central role in the analysis of the long-term behaviour of dynamical systems. We introduce the concept of a backward recurrent point and examine its relationship with its forward counterpart. Furthermore, we establish how different types of backward recurrence relate to various classes of backward limit sets [2, 3], and investigate the connection between minimality and uniform backward recurrence.

References

[1] W. H. Gottschalk, G. A. Hedlund, "Topological Dynamics" *American Mathematical Society: Colloquium publications*, American Mathematical Society (1955)

[2] F. Balibrea, G. Dvorníková, M. Lampart, P. Oprocha, "On negative limit sets for one-dimensional dynamics" *Nonlinear Anal.* 75 (2012), 3262-3267

[3] J. Hantáková, S. Roth, "On backward attractors of interval maps" *Non-linearity* 34 (2021) 7415-7445

Transitivity in Mahavier dynamical systems

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Abstract

We generalize the notion of transitive dynamical systems (X, f), where X is a compact metric space and $f : X \to X$ is a surjective function to closed relation dynamical systems (X, G) and subsequently to the Mahavier dynamical system $(\star_{n=1}^{\infty} G, \sigma)$. We study the conditions for the closed relation dynamical system (X, G) that imply that the Mahavier dynamical system $(\star_{n=1}^{\infty} G, \sigma)$ is transitive.

References

[1] Banič, I., Erceg, G., Kennedy, J "A transitive homeomorphism on the Lelek fan". *Journal of Difference Equations and Applications* (2023)

[2] Iztok Banič, Goran Erceg, Sina Greenwood, Judy Kennedy "Transitive points in CR-dynamical systems", *Topology and its Applications* (2023), Volume 326, 108407, ISSN 0166-8641.

Integral version of the MW operator

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Abstract

The MW operator, associated with the Matkowski–Wesołowski problem, arises in the study of invariant probability measures under the dyadic transformation (see [3, 4, 5]). In this talk, we continue the investigation of the MW operator initiated in [1, 2] by studying its integral version. We show that, under suitable regularity assumptions, the identity function is the unique (up to a multiplicative constant) solution to the integral version of the Matkowski–Wesołowski problem. Applying a medial limit, we further characterize all solutions of bounded variation.

References

[1] O. Maslyuchenko, J. Morawiec, T. Zürcher "Invariant probability measures under p-adic transformations" *https://doi.org/10.48550/arXiv.2412.06406*

[2] O. Maslyuchenko, J. Morawiec, T. Zürcher, "Operators arising from invariant measures under some class of multidimensional transformations" *https://doi.org/10.48550/arXiv.2603.06076*

[3] J. Morawiec, T. Zürcher "On a problem of Janusz Matkowski and Jacek Wesołowski" *Aequationes Mathematicae* 92 (2018), 601–615

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[5] J. Morawiec, T. Zürcher "Another look at the Matkowski and Wesołowski problem yielding a new class of solutions" *Aequationes Mathematicae* 99 (2025), 1047–1065

Chaotic or weird? Exploring a 2D discontinuous map arising in an economic application

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Abstract

We consider a 2D discontinuous map $F : \mathbb{R}^2 \to \mathbb{R}^2$ defined as follows:

$$F : \begin{pmatrix} x \\ y \end{pmatrix} \to \begin{cases} \begin{pmatrix} 1+b-c-A_1 & -b \\ 1 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} A_0 \\ 0 \end{pmatrix} & \text{if } x < -h \\ \begin{pmatrix} 1+b-c & -b \\ 1 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} & \text{if } |x| < h \\ \begin{pmatrix} 1+b-c-B & -b \\ 1 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} & \text{if } x > h \end{cases}$$

where $A_1 > 0,\ B > 0,\ b > 0,\ h > 0, A_0 > -A_1/h$. This map results from the behavior of central banks that follow two different strategies with respect to trading amounts. From a dynamical point of view, map F is interesting because it allows us to compare recently discovered weird quasiperiodic attractors (see, e.g., [1]) with chaotic attractors. In particular, we compare mechanisms of their appearance/disappearance related to homoclinic bifurcations.

References

[1] L. Gardini, D. Radi, N. Schmitt, I. Sushko and F. Westerhoff, "On the emergence and properties of weird quasiperiodic attractors", CSF 199 (2025), 116916.

Effects of a two-tier transaction tax system in speculative markets

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Abstract

We investigate the impact of a two-tier transaction tax system on the dynamics of a speculative market model with chartists and fundamentalists. In our framework, prices respond to speculators' order flow: chartists extrapolate price trends, whereas fundamentalists anticipate mean reversion. When the asset price leaves a predefined band, policymakers increase the tax rate to curb speculative activity. As a consequence of the tax system, the dynamics are governed by a piecewise-defined map. We identify conditions under which the tax system transforms divergent dynamics into bounded dynamics and, conversely, conditions under which it turns fixed-point dynamics into bounded or divergent dynamics. As a byproduct, the tax system may also generate multistability, involving weird quasiperiodic attractors.

On the behavior of market makers and the emergence of weird quasiperiodic attractors in financial markets

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Abstract

We analyze a financial market in which a market maker sets prices based on order flows from chartists and fundamentalists. To sustain market activity and ensure profitability, the market maker adjusts prices more strongly when the price is relatively stable and close to its fundamental value F. Specifically, the market maker updates the price according to

$$P_{t+1} = \begin{cases} P_t + a_h \left(D_t^c + D_t^f \right), & \text{if } |P_t - P_{t-1}| < h_x \text{ and } |P_t - F| < h_y, \\ P_t + a_l \left(D_t^c + D_t^f \right), & \text{otherwise,} \end{cases} \tag{1}$$

where $a_h > a_l$, $h_x > 0$, and $h_y > 0$. Here D_t^c and D_t^f denote the orders of chartists and fundamentalists, respectively, and F is the fundamental value. Chartists submit orders based on recent price trends, modeled as

$$D_t^c = b\,(P_t - P_{t-1}), \qquad b > 0, \tag{2}$$

whereas fundamentalists trade based on deviations from the fundamental value, with orders given by

$$D_t^f = c\,(F - P_t), \qquad c > 0. \tag{3}$$

Despite its simplicity, this model—which corresponds to a two-dimensional discontinuous piecewise linear map—exhibits rich dynamics. In particular, regular dynamics may coexist with oscillating dynamics, even in the absence of hyperbolic cycles. Although the dynamics may appear chaotic, they are not. Instead, they are associated with a novel class of attractors, termed *weird quasiperiodic attractors*.

References

[1] L. Gardini, D. Radi, N. Schmitt, I. Sushko, and F. Westerhoff, "On the limits of informationally efficient stock markets: New insights from a chartist–fundamentalist model", *International Review of Financial Analysis*, 105, 2025, 104436.

[2] L. Gardini, D. Radi, N. Schmitt, I. Sushko, and F. Westerhoff, "On the emergence and properties of weird quasiperiodic attractors", *Chaos, Solitons & Fractals*, 199, 2025, 116916.

On a new class of maps possessing weird quasiperiodic attractors (WQAs)

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Abstract

We consider a new class of 2D discontinuous maps characterized by attractors that are WQAs [1]:

Definition (Class-2 maps). *A piecewise-linear map T on $\mathbb{R}^2$ is Class-2 if each piece of T has the form*

$$T_k : \begin{cases} x' = f_k(x) := x + \mu_k \\ y' = g_k(x, y) := a_k x + b_k y + c_k \end{cases}$$

with a_k, b_k, c_k, $\mu_k \in \mathbb{R}$.

The discontinuity set (or, in other words, the switching manifolds) of map T separating $k \geq 2$ partitions can consist of any (finite) number of 1D manifolds. Each piece of a Class-2 map T is triangular, but the map T (as a whole) is not triangular unless all switching manifolds are lines of the form $x = x_0$.

We describe some basic properties of the maps in Class-2 and present examples of WQAs of maps in this class that arise in an engineering application [2].

References

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Green Transformation and Fiscal Policy in a Two-Sector OLG Model with Production Externalities*

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Abstract

This article studies the decarbonisation of an economy using an analytically tractable overlapping-generations model with a green and a brown production sector that allows for factor-intensity reversals. Agents derive utility from consumption and disutility from pollution. We show that socially desirable allocations can be implemented by fiscal policies consisting of an emissions tax and intergenerational transfers that maintain a zero primary deficit. Emissions tax receipts are redistributed as climate dividends that compensate agents for policy-induced factor-price distortions. Depending on fundamentals, there may exist multiple modified golden-rule steady states with distinct consumption and pollution levels whose stability properties are determined by the sector-specific capital intensities.

Keywords: Overlapping generations, two-sector growth models, production externalities, green transformation, climate policy, golden rules.

JEL Classification: D61, D62, E62, H23, O41, P28.

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Convex semi-continuous solutions of polynomial-like iterative equations

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Abstract

The existence of increasing convex continuous solutions to polynomial-like iterative equations on compact intervals has been established via the Schauder fixed point theorem and the Banach contraction principle, under the restrictive Lipschitz assumption on the given function. In this talk, we revisit this problem by weakening the regularity requirements and eliminating the Lipschitz condition. Using the Knaster–Tarski fixed point theorem, we obtain sufficient conditions for the existence of increasing convex semi-continuous solutions. Moreover, this approach yields additional structural insight, showing that the set of such solutions forms a complete lattice and hence admits minimum and maximum such solutions, going beyond earlier results that ensured only existence or uniqueness. This talk is based on joint work [1] with Weinian Zhang.

References

[1] Chaitanya Gopalakrishna and Weinian Zhang, Convex semi-continuous solutions of polynomial-like iterative equations, *Appl. Math. Lett.*, 173 (2026), Paper No. 109785.

FX-constrained growth: Fundamentalists, contrarians, trend-extrapolators and the dynamic trade-multiplier

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Abstract

We study a discrete-time dynamical system arising from a heterogeneous agents model of a developing economy foreign exchange (FX) market in which agents are distinguished by their trading strategies and by whether their activity is speculative or non-speculative. The non-speculative sector links FX demand to domestic economic activity, giving rise to a market-clearing output growth rate that, in the steady state, coincides with the ratio of FX supply growth to the income elasticity of demand for foreign assets, i.e. a generalised dynamic trade multiplier. We characterise the fixed points of the system and derive analytical conditions for local stability, showing that the model undergoes Flip and Neimark-Sacker bifurcations as key parameters vary. The analysis of the basins of attraction reveals multistability, and in the (e_{t-1}, e_t) space we report the coexistence of two stable fixed points and two chaotic attractors. Numerical simulations show that the model reproduces non-Gaussian distributions of exchange rate returns and output growth fluctuations, consistent with stylised facts documented for Latin American economies. Time-varying parameter estimation confirms that the dynamic trade multiplier closely tracks observed growth trajectories in Latin America.

A small scale model reproducing volatility clustering in financial markets

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Abstract

We consider a nonlinear discrete-time model describing the joint evolution of a market price and an expectation variable.

$$x_{t+1} = y_t, \tag{1}$$

$$y_{t+1} = y_t + \frac{\mu}{2}\left[\alpha(1+m)(F-y_t) + (1-m)h(y_t - x_t)\right], \tag{2}$$

where $F > 0$ is the fundamental value, $\mu > 0$ is the speed of adjustment, $\alpha > 0$ measures the strength of mean reversion towards fundamentals, and $m \in (-1, 1)$ governs the relative weight of the two behavioral components.

The nonlinear function $h(\cdot)$ is defined as

$$h(z) = \begin{cases} \dfrac{a(z+\delta)}{1+c(z+\delta)^2}, & z \le -\delta, \\ 0, & |z| < \delta, \\ \dfrac{a(z-\delta)}{1+c(z-\delta)^2}, & z \ge \delta, \end{cases} \tag{3}$$

where $a > 0$, $c > 0$, and $\delta > 0$.

We investigate the dynamical regimes and bifurcation scenarios of a deterministic system, paying particular attention to parametric regions characterized by the coexistence of attractors. For the stochastic variant of the model ($F \to F + \varepsilon\xi_t$) we demonstrate the emergence of volatility clustering and describe the mechanism underlying its appearance using the stochastic sensitivity function method.

Bifurcation structures for a 1D piecewise linear map with two kink points and two discontinuities

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Abstract

We consider a piecewise linear map defined by five branches in the following form:

$$x' = \begin{cases} (\beta-\alpha)x + (\alpha_0-\alpha)\gamma, & x < -\gamma, \\ (\beta-\alpha_0)x, & -\gamma \le x \le -1, \\ -\alpha_0 x, & -1 < x < 1, \\ (\beta-\alpha_0)x, & 1 \le x \le \gamma, \\ (\beta-\alpha)x - (\alpha_0-\alpha)\gamma, & x > \gamma, \end{cases} \tag{1}$$

where $\alpha_0 > -1$, $\alpha > -1$, $\beta > 0$, $\gamma > 1$. The map (1) originates from a particular model of a financial market with heterogeneous agents (see, e.g., [1]). We focus on analyzing which dynamic regimes can occur depending on the parameters of the map. In particular, we aim at providing a description of two different bifurcation structures in the parameter space, which are related to periodic dynamics.

References

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Continuity of the topological pressure for piecewise monotonic maps under C^1-perturbations

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Abstract

Assume that $T : [0,1] \to [0,1]$ is a C^1-map satisfying that $\{c \in (0,1) : T'c = 0\}$ is finite. Then T is a piecewise monotonic map, this means there exists a finite partition $\mathcal{Z}$ of $[0,1]$ into pairwise disjoint open intervals with $\overline{\bigcup_{Z\in\mathcal{Z}} Z} = [0,1]$ such that $T\big|_Z$ is continuous and strictly monotonic (increasing or decreasing) for every $Z \in \mathcal{Z}$. Fix an $N \in \mathbb{N}$ with $N > \mathrm{card}\big(\{c \in (0,1) : T'c = 0\}\big)$, and denote by $\mathcal{M}_N$ the family of all C^1-maps $S : [0,1] \to [0,1]$ which are piecewise monotonic with at most N intervals of monotonicity. Endow this family with the C^1-topology, this is the topology given by the norm $\|S\| := \max_{x\in[0,1]} |Sx| + \sup_{x\in(0,1)} |S'x|$.

If $p(T,f) > \sup_{x\in[0,1]} f(x)$ is satisfied, then the topological pressure is lower semi-continuous. By an example it is shown that the topological pressure may "jump down". However, the topological pressure is always upper semi-continuous. This implies that the topological entropy is continuous. Finally also a result on continuity of the measure of maximal entropy is presented.

On the transfer operators for position dependent random maps

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Abstract

In this paper, we investigate the Koopman and the Perron-Frobenius operators for position dependent random maps (introduced in [1]) $T = \{\tau_k, q_k\}, 1 \leq k \leq K$ defined on a probability space $(E, \mathcal{B}, \rho)$. That is $\tau_k : E \to E$ is a ρ-nonsingular transformation and $q_k : E \to [0,1]$ such that $\sum_{k=1}^{k=K} q_k(x) = 1$ for any $x \in E$ and

$$T(x) \;=\; \tau_k(x) \quad \text{with probability} \quad q_k(x); \quad k = 1, 2, \cdots K, x \in E$$

For this aim, we first associate a discrete random dynamical system to T in the same way as in [3], then we use general results of [2].

References

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On the Lebesgue Decomposition of Additive Kernels

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Abstract

Let $\mathbb{P} = (P_t)_{t>0}$ be a semigroup of kernels on a measurable space $(E, \mathcal{E})$. A kernel K from E into $]0, \infty[$ is said to be $\mathbb{P}$-additive if

$$P_t K(x, A) \;=\; K(x, A + t);\; t > 0, x \in E, A \in \mathcal{A}$$

where $\mathcal{A}$ denotes the Borel σ-algebra of $]0, \infty[$.
Additive kernels are introduced in our paper [1] and are used to prove an integral representation of potentials in general settings. If $\mathbb{P}$ is the transition function of a Markov process, additive kernels are always obtained as expectation of homogeneous random measures introduced in [2] and intensively studied until now.
In this paper, we investigate the Lebesgue decomposition of additive kernels with respect to the Lebesgue measure on $]0, \infty[$ and we characterize the class of additive kernels which are absolutely continuous.

References

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Persistence and extinction in a stochastic evolutionary Beverton-Holt model

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Abstract

We study persistence and extinction in a stochastic eco–evolutionary Beverton–Holt system with Allee effects, where population abundance and a quantitative trait evolve jointly under multiplicative environmental noise. The analysis reveals two effective growth exponents that determine long–term outcomes. In the strong–Allee regime, the model exhibits *pathwise bistability*: trajectories starting from the same initial condition may either go extinct or persist, a phenomenon absent in the deterministic case. Using a Wasserstein metric framework for the associated Markov semigroup, we establish contraction, uniqueness of invariant measures, and time–averaged stochastic persistence. These results show how noise and Allee thresholds interact to create sharp persistence–extinction transitions.

Approximating basin boundaries using a support vector machines and differential equations

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Abstract

We present a novel approach for detecting basin boundaries in discrete dynamical systems. Such boundaries separate basins of attraction and play a fundamental role in nonlinear dynamics, yet are rarely available in closed form. Classical approaches typically rely on identifying saddle-type invariant sets and approximating their stable manifolds, which often constitute the basin boundary. These methods require detailed knowledge of the system and may become computationally demanding.

In contrast, we formulate basin boundary detection as an iterative, data-driven procedure combining support vector machines (SVMs, [1]), differential equation-based techniques, and adaptive refinement. The resulting algorithm is efficient and flexible, requiring minimal prior information about the system - in particular, it can be applied when the dynamics are accessible only through experimental observations.

The method is demonstrated in two-dimensional systems, where it captures basin boundaries without explicit computation of stable manifolds. While restricted to low-dimensional cases, the approach appears promising for extension to higher-dimensional systems and models with noise.

Beyond dynamical systems, the method can also be used to identify boundaries between parameter regimes in more general models. The main ideas and concepts underlying the algorithm are presented and its performance is demonstrated on a collection of examples taken from models in economics and finance.

References

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