Limit sets of discrete dynamical systems (LISEDIDYS)

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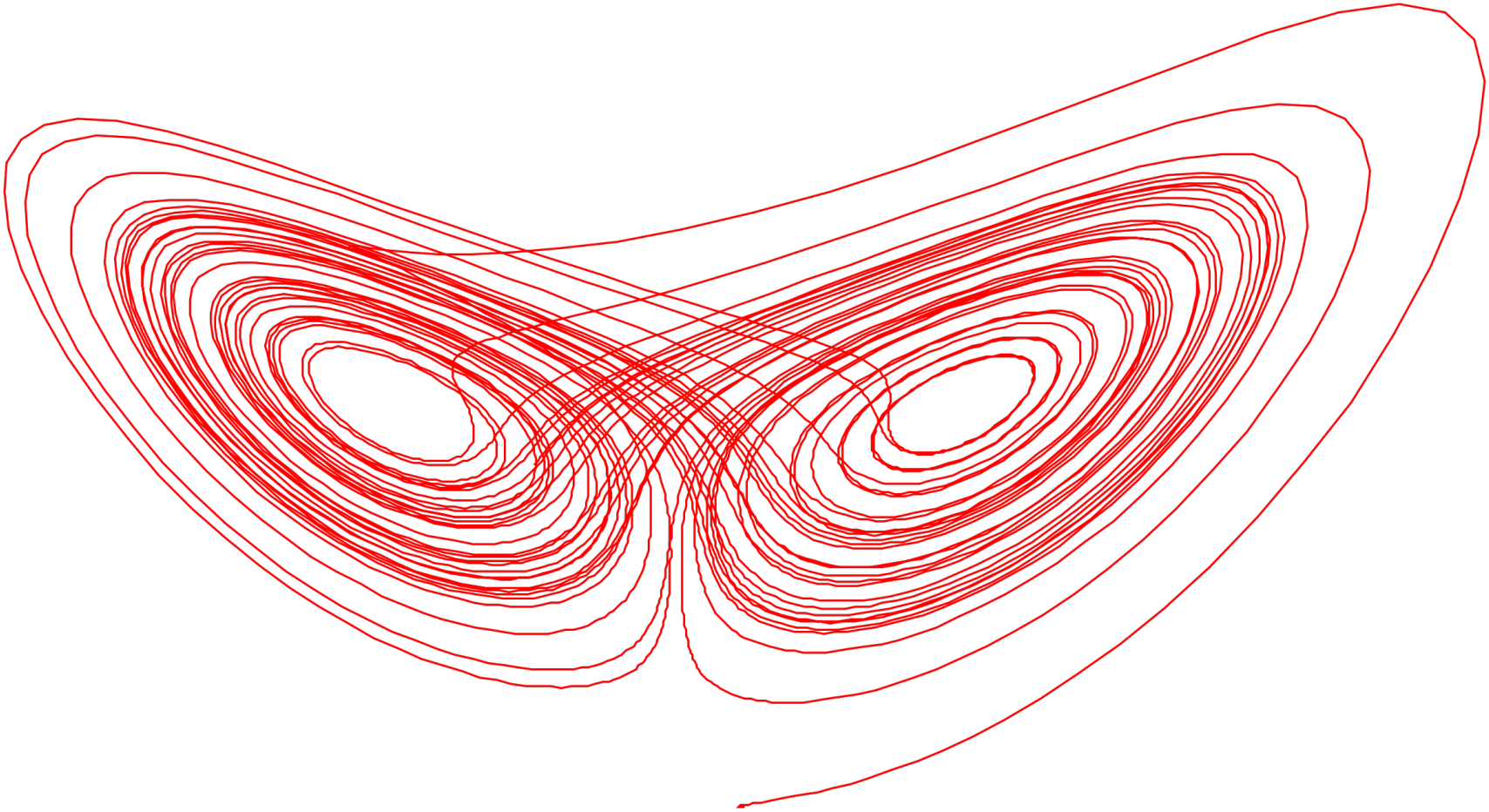
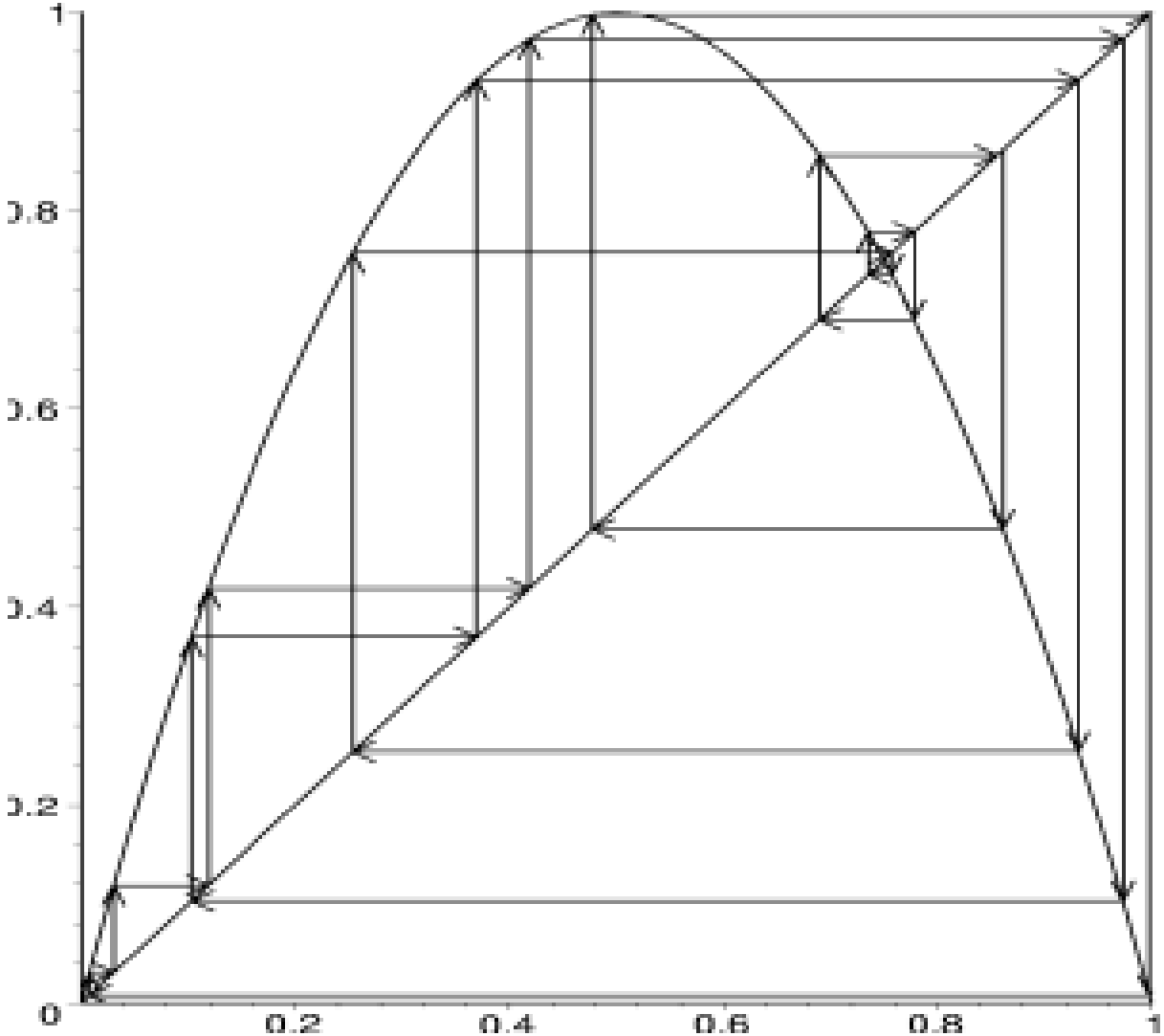
What is my research about?

A **dynamical system** is a system an evolution rule = function that describes what future states follow from the current state.
The time can be either continuous (flow, dynamical system defined by ordinary differential equation) or **discrete**. A **limit set** of a tracjectory is a set toward which the trajectory tends to evolve in time $+\infty$ or $-\infty$. Forward limit set of a wide set of trajectories (for example, of the whole phase space) is usually called *attractor*.

Continuous dynamical system



Discrete dynamical system



How to write the proposal

- write a few sentences for every requirement (even if it seems not relevant to your project)
- see the reviewer's manual (the review is based on checking boxes and yes/no questions)
- take your time, writing a good proposal is a long-term challenge
- write more then 10 pages required in part B1 and then cross out
- avoid vague and general phrases

1 Excellence

Be as specific as possible.

Example - Research methodology
Some of the results in [2] were obtained using methods from the *combinatorial dynamics*. This theory has its roots in the Sharkovsky theorem, which describes the possible sets of periods of all cycles (periodic orbits) of a continuous map of an interval into itself. The whole theory, which was developed based on this theorem, deals mainly with combinatorial objects, permutations, graphs. It seems that similar approach could be applied on the Conjecture 1.6, Problem 1.7 and Conjecture 1.8.

Explains why is this supervisor and research institute the best choice for you.
Again, be specific (provide names of future collaborators, titles of seminars or events).

Example - Two way transfer of knowledge It seems that the techniques for studying the σ-limit sets will rely on the knowledge of the specification property and ergodic theory and thus Oprocha's expertise in these theories (demonstrated e.g. by joint project with J. Li[1]) is going to be a great importance.

[1] J. Li, P. Oprocha, *Properties of invariant measures in dynamical systems with the shadowing property*, Erg. Th. and Dyn. Syst. **38** (2018), 2257–2294.

Do not forget the soft skills.

Example - Soft skills Secondly, working at AGH UST will give me the opportunity to participate the following soft skills trainings available at AGH UST:

- trainings on tools of biometrics (Web of Knowledge, Scopus, JCR, etc.) organized by the Main Library of AGH
- trainings for writing applications for grants organized by AGH or by National Contact Point for Research Programmes of the EU
- courses on didactics organized by Center of Didactics of AGH
- courses and webinars on e-learning, preparing a research presentation or designing an online course organized by Centre of e-Learning at AGH

1.4 Potential of the researcher to reach or re-enforce professional maturity/independence during the fellowship

Explain your strenghts and weaknesses

/....I have previous experience with producing publication for which I am a sole author but I am lacking experience with working in a research team..../

and what are you expecting from this project.

/I hope that the outcome of this project will be excellent papers which will enable a perfect restart to my career after career break due to the maternity leave and form the basis for my habilitation thesis./

2 Impact

Dissemination

- Conferences
- Seminars and workshops
- Scientific publications (how many?)

Exploitation

Write about applications of your research. If there is no direct application, write about long-term exploitation of the fundamental research in your field.

Be honest.

Example - Exploitation The results will be exploited primarily for further progress by the research groups and the wider topological dynamics community.

Quality of the proposed measures to communicate the project activities to different target audiences

Explain how you will communicate your results both to public and to mathematical community.

You can participate in many public events:

- Pi Day
- Researcher's Night
- Open Day
- Festival of Science, Week of Science and Technology

3 Implementation

Define milestones:

Milestone 1: Decision of the strategy for determination of conjectures (proving or disproving by an counterexample).

Divide your project into several work packages:

WP1: **Constructing examples**

- Task 1.a: Construction of limit sets and their basins for different kinds of interval maps (e.g., transitive map, map of type 2^∞, positive entropy map)
- Task 1.b: ...
- Task 1.c: ...

Include non-research WP: Dissemination and Public Engagement, Progress Monitoring.

Define deliverables:

WP5 – **Dissemination and Public Engagement**
Deliverables: 5.1 & 5.2 & 5.3 - Seminar talks on joint seminar of AGH UST.... 5.13 - Festival of Exact Sciences. A2 & A3 & A4 - Articles written (numbered by respective work package).

Create the chart.

Work Package	ASSIGNED TO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WP1	Research part 1																
WP2	Research part 2					M1				M2							
WP3	Research part 3														M3		
WP4	Research part 4																
WP5	Dissemination and commn.	D5.1			D5.10		D5.2,D5.4	D5.5	D5.8,D5.9	D5.6,A2		D5.13	D5.3		A3	D5.12	D5.11
WP6	Progress monitoring			D6.3			D6.1, D6.4			D6.5	D6.2		D6.6			D6.7	

Appropriateness of the management structure and procedures, including risk management

- remember that if you succeed then the proposal will be part of the grant agreement
  /...Approximately 300 EUR designated for the management and indirect costs will be spend each month for the assistance on the project, which includes checking financial reports and helping to manage the project in general. /
- do not underestimate risk analysis and contingency plan
  /...In case of failure I will spend more time with special cases of these problems, for example, with solution for the class of unimodal interval maps../

Good luck with your proposal

and

thank you for your attention!