CoCo Seminar Series
Fall 2022

Analysis of Discrete Dynamical Systems: An Algebraic Perspective

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Wednesday October 26, 2022
12:00-1:00pm EDT
On Zoom (meeting link available on http://coco.binghamton.edu/)

We consider (finite, discrete-time) dynamical systems in the most general sense, as a finite sets of states with a (deterministic) transition to the next state. As such, dynamical systems can be used for modelling phenomena or devices (e.g., physical or software) of scientific or engineering interest. It is often necessary to detect interesting behaviour in such systems, such as stable or repeated behaviour, sensitivity with respect to the initial conditions, or reversibility. However, it is often convenient to first decompose larger systems into smaller ones, easier to analyse separately, and then deduce the overall behaviour from that of these components. We will consider one among several possible approaches to this task, where each system is obtained from smaller ones by two appropriate algebraic operations of sum and product (alternate and synchronous execution, respectively), and investigate questions such as the solvability of equations involving these operations and the existence of prime elements (basic building blocks necessary in order to construct arbitrary larger systems).

Dr. Antonio E. Porreca is a maître de conférences (lecturer) at Aix-Marseille Université, France and a researcher at Laboratoire d'Informatique et Systèmes (LIS) in Marseille, where he is a member of the CANA research group on natural computing [cana.lis-lab.fr]. In the past, he mostly worked on the computational complexity theory of biologically inspired, unconventional computing models (such as membrane systems and reaction systems), with a bit of research on cellular automata and Boolean networks. More recently he has focused on the aforementioned algebraic approach to the decomposition of discrete dynamical systems.

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