7th CI²MA Focus Seminar
"Sistemas Dinámicos Discretos"
Supported by Centro de Ingestigación en Ingeniería Matemática

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Auditorio Alamiro Robledo
Facultad de Ciencias Físicas y Matemáticas
Universidad de Concepción

Organizer: Anahí Gajardo

Programme

10.00 **Nicolas Ollinger** (Université d' Orléans, France):
Substitutions and strongly deterministic tilesets

10.45 **Coffee break**

11.00 **Martin Delacourt** (Centro de Modelamiento Matemático (CMM) U. de Chile):
Mu-limit sets of two-dimensional cellular automata

11.30 **Anahí Gajardo** (CI²MA & Depto. de Ing. Matemática, U. de Concepción):
Decidability of time symmetry in dimension 1

12.00 **Discussion**

12.30 **Lunch**

15.00 **Rodrigo Torres** (Depto. de Ingeniería Matemática, U. de Concepción):
Coded t-shifts

15.30 **Diego Maldonado** (Depto. de Ing. Matemática, U. de Concepción):
Turmit number 6: Simpler but with the same complexity

15.50 **Guillaume Theyssier** (Centro de Modelamiento Matemático (CMM) U. de Chile):
Introducing freezing automata

16.20 **Coffee break**

17.00 **Discussion**

20.00 **Dinner**

Practical information

Seminar participants who would like to join dinner should register with CI²MA secretary:

Ms Angelina Fritz, CI²MA
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Abstracts

Substitutions and strongly deterministic tilesets

Nicolas Ollinger[1], Bastian Le[2]

Substitutions generate hierarchical and usually aperiodic colorings of the plane. Despite the non-locality of substitution rules, one can devise finite tilesets whose set of tilings encodes a locally checkable representation of these hierarchical colorings. After reviewing this classical result and some of its extensions, we show that for 2x2 substitutions the resulting tileset can furthermore be chosen strongly deterministic. A tiling by a strongly deterministic tileset can be locally reconstructed starting from any infinite path that cross every line and column of the tiling.

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Mu-limit sets of two-dimensional cellular automata

Martin Delacourt[1]

Mu-limit sets of cellular automata are a probabilistic version of limit sets. They are subshifts describing the long-term typical behaviors of CA. In this talk we will first present a few properties of mu-limit sets in the two-dimensional case, and then, thanks to a special construction, we will prove some complexity and reachability results.

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Decidability of time symmetry in dimension 1

Anahí Gajardo[1]

The notion of time-symmetry refers to the inability of distinguishing between backward and forward time directions. The property have been proved undecidable for cellular automata of dimension 2 or higher. Now its undecidability is stablished for dimension 1.

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Coded t-shifts

Rodrigo Torres[1]

Coded shifts have been defined by Blanchard and Hansel in 1991. They are a natural extension of sofic transitive systems. We characterize them within the context of the t-shift associated to a Turing machine, and give several examples.

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Turmit number 6: Simpler but with the same complexity

Diego Maldonado[1]

A particular generalization of Langton's Ant, consists in to take n colors, each with an turning direction "to the left" or "to the right" and which the Ant switches in a ciclic way. This generalization is called turmite, and simulations show a high diversity of behaviours. Turmite number 6 builds a highway just like Langton's ant does, but its period is 18 and its transient is often around 50 iterations. Logical circuits can be also embedded in this system showing that predicting this ant is as complex as predicting the classical one.

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Introducing freezing automata

Guillaume Theyssier[1]

In this informal talk, we will consider a simple class of cellular automata that captures a bunch of growing processes or dissemination phenomena, ranging from bootstrap percolation to self-assembly tilings. We will advocate that several questions that already received a lot of attention in specific contexts deserve to be consider in this general framework.

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