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Certificate

Mathematical Institute in Opava, Silesian University in Opava hereby certifies that Professor **Chemlal Rezki**, from University of Bejaia, Algeria, participated in the "7th Visegrad Conference on Dynamical Systems, Opava 2017", presented the talk *Some ergodic properties of almost equicontinuous cellular automata* and paid the conference fee 260 EUR.

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Some ergodic properties of almost equicontinuous cellular automata.

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Abstract

A cellular automaton is made of an infinite lattice of finite identical automata. The lattice is usually $\mathbb{Z}^n$ with n called the dimension of the cellular automaton. Each automaton updates its state synchronously according to a local rule on the basis of its actual state and of the one of a fixed finite set of neighboring automata. The set of possible states of an automaton is called the alphabet and each element of the alphabet is referred to as a letter. A configuration is a snapshot of the state of all automata in the lattice.

Dynamical behavior of CA is studied mainly in the context of discrete dynamical systems by equipping the space of configurations with the product topology which make it homeomorphic to the Cantor space.

To be able to use the tools of ergodic theory one can equip the space of configurations with the uniform measure i.e. the measure giving to any letter the same probability.

An element of the unit circle is an eigenvalue of a cellular automaton F associated to the eigenfunction g if we have $g \circ F = \lambda.F$. Whether we place ourselves from the topological or ergodic perspective the function g have to be continuous or measurable. An eigenvalue $\lambda = \exp(2I\pi\alpha)$ is said irrational if α is an irrational number. The set of all eigenvalues is called the spectrum of the cellular automaton.

Based on the Wolfram's work, Gilman [1][2] introduced a classification using Bernoulli measures which are not necessarily invariant. Cellular automata can then be divided into three classes : CA with equicontinuous points, CA with almost equicontinuous points but without equicontinuous points and almost expansive CA.

In [3] Tisseur extends the Gilman's classification to any shift ergodic measure and gives an example of a cellular automaton with an invariant measure which have almost equicontinuous points but without equicontinuous points.

We show that a cellular automaton with almost equicontinuous points according to Gilman's classification cannot have any irrational eigenvalue.