Keio Dynamics Day 2019

$\sim$ Interactions with number theory $\sim$

Date: 15th March 2019 (Fri)
Venue: Department of Mathematics, Keio University, Building 14, room 733
Access: https://www.st.keio.ac.jp/en/about/access.html

13:30 - 14:20 Arnaldo Nogueira (Aix Marseille University)
Rotation number of contracted rotations

14:30 - 15:20 Hajime Kaneko (University of Tsukuba)
Analogy with the Lagrange spectrum for geometric sequences

15:30 - 16:20 Kenichiro Yamamoto (Nagaoka University of Science and Technology)
Large deviation principle for linear mod 1 transformations and generalized beta transformations

16:30 - 17:20 Hiroki Takahasi (Keio University)
Maps of intervals with indifferent fixed points: large deviation principles

Arnaldo Nogueira (Aix Marseille University)
Rotation number of contracted rotations

Let $0 < a < 1$, $0 \leq b < 1$ and $I = [0, 1)$. We call *contracted rotation* the interval map $\varphi_{a,b}\colon x \in I \to ax+b \bmod 1$. Once the parameter a is fixed, we are interested in the family $\varphi_{a,b}$, where b runs on the interval I. We use the fact that, as in the case of circle homeomorphisms, any contracted rotation $\varphi_{a,b}$ has a rotation number which depends only on the parameters a and b. We will discuss the dynamical and Diophantine aspects of the subject. In particular, we will show that, if a and b are algebraic numbers, the rotation number is rational using a transcendence theorem about the value of the Hecke-Mahler series at an algebraic point.

Hajime Kaneko (University of Tsukuba)
Analogy with the Lagrange spectrum for geometric sequences

Weyl proved that an arithmetic progression is uniformly distributed modulo 1 if and only if the common difference is an irrational number. The fractional part of an arithmetic progression is well-known even if the common ratio is a rational number.

However, little is known on the distribution of a geometric progression $\xi\alpha^n$ $(n = 0, 1, \ldots)$ modulo 1. In this talk we study the distance $\|\xi\alpha^n\|$ from $\xi\alpha^n$ to its nearest integers in the case where α is a quadratic Pisot unit. In particular, we investigate the set $\{\limsup_{n\to\infty} \|\xi\alpha^n\| \mid \xi \in \mathbb{R}\}$, which gives analogy with the Lagrange spectrum.

This is a joint work with Shigeki Akiyama and Teturo Kamae.

Kenichiro Yamamoto (Nagaoka University of Science and Technology)
Large deviation principle for linear mod 1 transformations and generalized beta transformations

In this talk, we show that all linear mod 1 transformations and generalized beta transformations satisfy a level-2 large deviation principle for the measure of maximal entropy. This is a joint work with Yong Moo Chung and Hiroki Takahasi.

Hiroki Takahasi (Keio University)

Maps of intervals with indifferent fixed points: large deviation principles

For a large class of interval maps with indifferent fixed points including Farey and Manneville-Pomeau maps, the thermodynamic formalism has been developed since the work of Prellberg and Slawny. Such systems display freezing phase transitions, the order of which depends on the behavior at the indifferent fixed points. Excluding from consideration all measures giving positive masses to the indifferent fixed points yields real-analytic pressure functions, for which a restricted thermodynamic formalism works in a very much similar way to the one for uniformly expanding maps with finitely many branches. We establish three large deviation principles associated with restricted equilibrium states at all temperature given by a restricted variational principle. Our method of proof is to analyze how induced Gibbs states on the full shift over infinite alphabet tie in with the original systems.

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