Mathematics Colloquium

Topological entropy of biparametric skew tent maps

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Friday, February 16, 2018
4:10 – 5 p.m.
Building 53 Room 201

Abstract

We consider skew tent maps $T_{\alpha,\beta}(x)$ such that $(\alpha,\beta) \in [0,1]^2$ is the turning point of $T_{\alpha,\beta}$, that is, $T_{\alpha,\beta} \coloneqq \frac{\beta}{\alpha}x$ for $0 \leq x \leq \alpha$ and $T_{\alpha,\beta}(x) \coloneqq \frac{\beta}{1-\alpha}(1-x)$ for $\alpha \leq x \leq 1$. We denote by $\underline{M} = K(\alpha,\beta)$ the kneading sequence of $T_{\alpha,\beta}$ and by $h(\alpha,\beta)$ its topological entropy. For a given kneading sequence $\underline{M}$ we consider equi-kneading, (or equi-topological entropy, or isentrope) curves $(\alpha, \varphi_{\underline{M}}(\alpha))$ such that $K(\alpha, \varphi_{\underline{M}}(\alpha)) = \underline{M}$. To study the behavior of these curves an auxiliary function $\Theta_{\underline{M}}(\alpha,\beta)$ is introduced. For this function $\Theta_{\underline{M}}(\alpha, \varphi_{\underline{M}}(\alpha)) = 0$, but it may happen that for some kneading sequences $\Theta_{\underline{M}}(\alpha,\beta) = 0$ for some $\beta < \varphi_{\underline{M}}(\alpha)$ with (α,β) still in the dynamically interesting quarter of the unit square. Using $\Theta_{\underline{M}}$ we show that the curves $(\alpha, \varphi_{\underline{M}}(\alpha))$ hit the diagonal $\{(\beta,\beta) : 0.5 < \beta < 1\}$ almost perpendicularly if (β,β) is close to $(1,1)$. Answering a question asked by M. Misiurewicz at a conference, we show that these curves are not necessarily exactly orthogonal to the diagonal, for example for $\underline{M} = RLLRC$ the curve $(\alpha, \varphi_{\underline{M}}(\alpha))$ is not orthogonal to the diagonal. On the other hand, for $\underline{M} = RLC$ it is.
With different parametrization, properties of equi-kneading maps for skew tent maps were considered by J.C. Marcuard, M. Misiurewicz and E. Visinescu.

About the speaker: Gabriella Keszthelyi is working on her Ph.D. at Eötvös Loránd University in Budapest, Hungary under the guidance of Zoltán Buczolich. Her research is in topological entropy of interval maps. She is currently a Young Researcher at Alfred Renyi Institute of Mathematics, Hungarian Academy of Sciences, in Budapest, Hungary, and last year she was a visiting researcher at Institut Mittag-Leffler, Sweden.

Cookies will be provided before the talk at 4 p.m.
in the same room as the talk, Building 53 Room 201.