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of analysis»

Book of abstracts



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LIST OF TOPICS

- Algebraic methods in geometry
- Differential geometry in the large
- Geometry and topology of differentiable manifolds
- General and algebraic topology
- Dynamical systems and their applications
- Geometric problems in mathematical analysis
- Geometric and topological methods in natural sciences
- History and methodology of teaching in mathematics

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НТБ ОНАФТ

More about set-theoretical entropies in generalized shifts

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For arbitrary map $f : A \rightarrow A$ and finite subset F of A [2]:

$$\text{ent}_{\text{set}}(f, F) := \lim_{n \rightarrow \infty} \frac{\#(F \cup f(F) \cup \dots \cup f^{n-1}(F))}{n}$$

exists and we call $\text{ent}_{\text{set}}(f) := \sup\{\text{ent}_{\text{set}}(f, F) : F \text{ is a finite subset of } A\}$, the set-theoretical entropy of $f : A \rightarrow A$.

Moreover, if $f : A \rightarrow A$ is surjective and finite fiber (i.e., $f^{-1}(x)$ is finite for all $x \in A$), then for finite subset F of A [5]:

$$\text{ent}_{\text{cset}}(f, F) := \lim_{n \rightarrow \infty} \frac{\#(F \cup f^{-1}(F) \cup \dots \cup f^{-(n-1)}(F))}{n}$$

exists and we call $\text{ent}_{\text{cset}}(f) := \sup\{\text{ent}_{\text{cset}}(f, F) : F \text{ is a finite subset of } A\}$, the contravariant set-theoretical entropy of $f : A \rightarrow A$.

Let's recall two well-known maps, one-sided shift $\{1, \dots, k\}^{\mathbb{N}} \rightarrow \{1, \dots, k\}^{\mathbb{N}}$ and two-sided shift $\{1, \dots, k\}^{\mathbb{Z}} \rightarrow \{1, \dots, k\}^{\mathbb{Z}}$

So for nonempty set Γ , arbitrary set X with at least two elements and self-map $\varphi : \Gamma \rightarrow \Gamma$ one may consider generalized shift $\sigma_{\varphi} : \prod_{(x_{\alpha})_{\alpha \in \Gamma} \mapsto (x_{\varphi(\alpha)})_{\alpha \in \Gamma}} X^{\Gamma} \rightarrow X^{\Gamma}$. It's evident that if X has topological (resp. group,

linear vector space) structure, then X^{Γ} has topological (resp. group, linear vector space) structure too.

Suppose X is a finite discrete space with at least two elements, Γ is an infinite set and $\varphi : \Gamma \rightarrow \Gamma$ is an arbitrary map also equip X^{Γ} with product (pointwise convergence) topology, then $\sigma_{\varphi} : X^{\Gamma} \rightarrow X^{\Gamma}$ is topological chaotic (positive topological entropy) if and only if $\varphi : \Gamma \rightarrow \Gamma$ has positive set-theoretical entropy [2].

Moreover if X is a non-trivial finite abelian group and $\varphi : \Gamma \rightarrow \Gamma$ is finite fiber, then algebraic entropy of $\sigma_{\varphi} \upharpoonright \bigoplus_{\alpha \in \Gamma} X : \bigoplus_{\alpha \in \Gamma} X \rightarrow \bigoplus_{\alpha \in \Gamma} X$ interacts with contravariant set-theoretical entropy of $\varphi : \Gamma \rightarrow \Gamma$ [1, 3].

In this talk we take a short tour on some obtained results on generalized shifts including: Devaney chaotic, Li-Yorke chaotic, e-chaotic, P-chaotic,.... generalized shifts including the list of published papers on the subject. Our final attention will be on generalized shifts set-theoretical entropies [4], with more details and results.

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