

GENERIC BIRKHOFF SPECTRA

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Let (Ω, σ) be the full-shift of two alphabets, and f be a continuous, real-valued function on it. Let L_f be the set of all of the possible limiting values of the Birkhoff averages of f , i.e.

$$L_f := \left\{ \alpha \in \mathbb{R} : \exists \omega \in \Omega \text{ such that } \lim_{N \rightarrow \infty} \frac{1}{N} \sum_{n=0}^{N-1} f(\sigma^n \omega) = \alpha \right\}.$$

For each $\alpha \in L_f$, we define the level set

$$E_f(\alpha) := \left\{ \omega \in \Omega : \lim_{N \rightarrow \infty} \frac{1}{N} \sum_{n=0}^{N-1} f(\sigma^n \omega) = \alpha \right\},$$

and we define a function $S_f : \mathbb{R} \rightarrow \mathbb{R}$, which we refer to as the Birkhoff spectra, as follows:

$$S_f(\alpha) := \begin{cases} \dim_H(E_f(\alpha)) & \alpha \in L_f, \\ 0 & \alpha \notin L_f, \end{cases}$$

where \dim_H is the Hausdorff dimension.

In this talk, we will discuss shapes and properties of the Birkhoff spectrum S_f for generic/typical continuous functions f in the sense of Baire category. In particular, we will be interested in the behavior of the spectrum near the boundary of L_f , such as the continuity and the values of one-sided derivatives.