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Topological entropy of piecewise bimonotone skew products

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(joint work with Franz Hofbauer and Peter Maličký)

By Misiurewicz-Szlenk theorem, for continuous interval maps the (positive) topological entropy is due to the existence of horseshoes. An analogous theorem, as well as its consequences, will be presented for a special class of skew products.

To describe this class, let B be a linearly ordered set, which is compact and metrizable with respect to the order topology, and $\mathcal{Z}$ a finite partition of B into clopen intervals. Let $f : B \to B$ be a continuous map, such that $f|_Z$ is monotone and $f(Z)$ is an interval for all $Z \in \mathcal{Z}$. Let I be the interval $[0, 1]$ and $X = B \times I$. By a "piecewise bimonotone skew product map" driven by the base map f we mean a skew product map $F(x, y) = (f(x), g_x(y))$ from X to X such that the fibre maps g_x are continuous piecewise monotone and are the same for all x belonging to the same $Z \in \mathcal{Z}$. The main result is that the topological entropy of a piecewise bimonotone skew product map is given by horseshoes and is lower semicontinuous, provided it is larger than the entropy of the base map f and the entropies in the fibres.