An entropy-like notion for low-complexity systems

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Resumo/Abstract:
We introduce an $\overline{R}^+$-valued topological invariant which measures the complexity of dynamical systems in (a part of) the zero entropy regime. This quantity, which we call ν-separation complexity, is zero for all isometries and Morse-Smale systems, but is highly sensitive to more complicated orbit structures. In particular, it takes strictly positive finite values for Denjoy homeomorphisms of the circle, Sturmian subshifts, regular Toeplitz flows, pinched skew-products with strange non-chaotic attractors and certain classes of quasicrystals. It is infinite for all systems with positive topological entropy or weakly mixing dynamics.

Apart from the above-mentioned examples, we discuss basic properties of ν-separation complexity. Some of these, like product formula or factor relation, are analogous to those of topological entropy, but others are – and even have to be – substantially different for conceptual reasons. An example for the latter is the lack of a variational principle, which would be incompatible with the distinction between irrational rotations and Denjoy homeomorphisms on the circle.

This is a joint work with Tobias Jäger (TU Dresden).