

Abundant rich phase transitions in step skew products

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Resumo/Abstract:

We study phase transitions for the topological pressure of geometric potentials of transitive sets. The sets considered are partially hyperbolic having a step skew product dynamics over a horseshoe with one-dimensional fibers corresponding to the central direction. The sets are genuinely non-hyperbolic containing intermingled horseshoes of different hyperbolic behavior (contracting and expanding center).

We prove that for every $k \geq 1$ there is a diffeomorphism F with a transitive set Λ as above such that the pressure map $P(t) = P(t\varphi)$ of the potential $\varphi = -\log dF|_{E^c}$ (E^c the central direction) defined on Λ has k rich phase transitions. This means that there are parameters t_ℓ , $\ell = 1, \dots, k$, where $P(t)$ is not differentiable and this lack of differentiability is due to the coexistence of two equilibrium states of $t_\ell\varphi$ with positive entropy and different Birkhoff averages. Each phase transition is associated to a gap in the central Lyapunov spectrum of F on Λ .

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