

Clustering of exponentially separating trajectories

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It might be expected that trajectories for a dynamical system which has no negative Lyapunov exponent (implying exponential growth of small separations will not cluster together. However, clustering can occur such that the density $\rho(\Delta x)$ of trajectories within distance Δx of a reference trajectory has a power-law divergence, so that $\rho(\Delta x) \sim \Delta x^{-\beta}$ when Δx is sufficiently small, for some $0 < \beta < 1$. We demonstrate this effect using a random map in one dimension. We find no evidence for this effect in the chaotic logistic map, and argue that the effect is harder to observe in deterministic maps.

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