Nonlinear Sciences > Chaotic Dynamics

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.

Submission history

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