Nonlinear Sciences > Chaotic Dynamics

Multicanonical Sampling of Rare Trajectories in Chaotic Dynamical Systems

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In chaotic dynamical systems, a number of rare trajectories with low level of chaoticity are embedded in chaotic sea, while extraordinary unstable trajectories can exist even in weakly chaotic regions. In this study, a quantitative method for searching these rare trajectories is developed; the method is based on multicanonical Monte Carlo and can estimate the probability of initial conditions that lead to trajectories of a given level of chaoticity. The proposed method is successfully tested with four-dimensional coupled standard maps, where probabilities as small as 10^{-14} are estimated.

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