

Rate-Dependent Destruction of Snapshot Tori in Hamiltonian Systems Subjected to Parameter Drift

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Abstract

In low-dimensional Hamiltonian systems subjected to parameter drifts we show that the dynamics can best be understood by following ensembles of initial conditions corresponding to tori of the initial system. When such ensembles are followed, torus-like objects called snapshot tori are obtained, which change their location and shape. After some time, most of the tori break up and become entrained into chaotic seas. Within such chaotic seas, we demonstrate the existence of a time-dependent snapshot horseshoe structure. The average pairwise distance initiated on an original torus hardly changes in time at first, but crosses over into an exponential growth when the snapshot torus breaks up. The crossover time depends on the rate for a given initial torus.