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(Submitted on 30 Jun 2011)

Nonlinear Sciences > Chaotic Dynamics

Central Limit Theorem

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We study chaotic orbits of conservative low--dimensional maps and present numerical results showing that the probability density functions (pdfs) of the sum of \$N\$ iterates in the large \$N\$ limit exhibit very interesting time-evolving statistics. In some cases where the chaotic layers are thin and the (positive) maximal Lyapunov exponent is small, long--lasting quasi--stationary states (QSS) are found, whose pdfs appear to converge to \$q\$--Gaussians associated with nonextensive statistical mechanics. More generally, however, as \$N\$ increases, the pdfs describe a sequence of QSS that pass from a \$q\$--Gaussian to an exponential shape and ultimately tend to a true Gaussian, as orbits diffuse to larger chaotic domains and the phase space dynamics becomes more uniformly ergodic.

Time--Evolving Statistics of Chaotic Orbits

of Conservative Maps in the Context of the

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