Observable asymptotic probabilities on deterministic dynamical systems

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Abstract:
We first prove that any continuous deterministic dynamical system defined on a compact metric space, has at least one observable probability measure, which is not necessarily ergodic but is intrinsic to the system. Observable measures describe the asymptotic behavior of the system. They are defined after an arbitrary probability distribution m which is given and fixed as a reference, and after assuming that the initial states of the system distribute according with the probability m. Usually the reference probability m is a normalized finite Lebesgue measure derived from a volume form, if the space is a finite dimensional riemannian manifold. We do not restrict the system to be conservative, that is, it does not necessarily preserve the reference probability m. In most known non conservative examples the observable probabilities, obtained assymtotically in the future, are mutually singular with the reference measure. We prove that the set of all observable probabilities is weak* compact. We define the global attractor A as the minimal compact support of all the observable probabilities. Our second result states that the statistical basin of attraction of A, covers m-almost all the space.