Shadowing and stochastic stability

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There is a strong and long-lasting interest in chaotic dynamical systems as mathematical models of various processes in different areas of science. Like for any other mathematical models for chaotic systems to be useful it is desirable that they have stability properties.

There are exist different stability properties. In particular, there exist two notions of stability with respect to small per-iteration perturbations – shadowing property and stochastic stability.

System is said to have shadowing property if every (pseudo)trajectory with small errors can be uniformly approximated by a trajectory without errors. System is stochastically stable if the noise perturbing the system is considered to be random and invariant measures for the stochastic process corresponding to the perturbed system converge to an invariant measure of the unperturbed system.

Although conceptually these properties are somewhat similar and it is known that some chaotic systems have both properties, no direct relations between shadowing and stochastic stability were established so far.

I will discuss some of these relations.