A simple approach to rigorous approximation of invariant measures

Stefano Galatolo

Abstract:
There are several numerical approaches to the computation of invariant measures and to the simulation of the statitical behavior of dynamical systems. We will be interested to approximations with an explicit estimate on the error. After reviewing some positive and negative previous results on the problem we will consider a general result on the rigorous approximation of fixed points of operators between Banach spaces. This statement is particularly suited for the approximation of invariant measures in dynamical systems and in particular by the Ulam method. We apply this result to implement an algorithm for the rigorous computation of invariant densities of piecewise expanding maps up to some error in the $ L^{1}$ distance. We show how several related computational and numerical issues can be solved and show some computer experiment. Time permitting we will also discuss how this approach can be applied to give approximation of the physical invariant measure for a class of piecewise hyperbolic system.