

Abstract

In this work we study strong spectral properties of Ruelle transfer operators related to a large family of Gibbs measures for contact Anosov flows. The ultimate aim is to establish exponential decay of correlations for Hölder observables with respect to a very general class of Gibbs measures. The approach invented in 1997 by Dolgopyat in “On decay of correlations in Anosov flows” and further developed in Stoyanov (2011) is substantially refined here, allowing to deal with much more general situations than before, although we still restrict ourselves to the uniformly hyperbolic case. A rather general procedure is established which produces the desired estimates whenever the Gibbs measure admits a Pesin set with exponentially small tails, that is a Pesin set whose preimages along the flow have measures decaying exponentially fast. We call such Gibbs measures regular. Recent results in Gouëzel and Stoyanov (2019) prove existence of such Pesin sets for hyperbolic diffeomorphisms and flows for a large variety of Gibbs measures determined by Hölder continuous potentials. The strong spectral estimates for Ruelle operators and well-established techniques lead to exponential decay of correlations for Hölder continuous observables, as well as to some other consequences such as: (a) existence of a non-zero analytic continuation of the Ruelle zeta function with a pole at the entropy in a vertical strip containing the entropy in its interior; (b) a Prime Orbit Theorem with an exponentially small error.