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RESONANCES FOR AXIOM A FLOWS

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Abstract

Given an Axiom A flow on M and smooth functions $B, C: M \mapsto R$, we show that the time correlation function ρ_{BC} for a Gibbs state ρ has a Fourier transform $\hat{\rho}_{BC}$ meromorphic in a strip. This complements a result by Pollicott [7]. The residues of the poles of $\hat{\rho}_{BC}$ are investigated. In the simplest case, they have the form $\sigma^-(B)\sigma^+(C)$ where σ^-, σ^+ are Gibbs distributions, i.e., (Schwartz) distributions on M further specified in the paper. This is a companion to an earlier paper [9] where similar results have been obtained for Axiom A diffeomorphism.

0. Introduction

In an earlier paper [9] we have studied the time correlation functions for Axiom A diffeomorphisms. These correlation functions have Fourier transforms which are meromorphic in a strip, and we have identified the residues of the poles in that strip in terms of *Gibbs distributions*. In the present paper we obtain a similar result for Axiom A flows.

Let (f^t) be a $C^{1+\varepsilon}$ Axiom A flow on a compact manifold M (which we may take as C^∞). We assume that ρ is a Gibbs measure on a nontrivial[1] basic set Λ (see Bowen and Ruelle [4]) and let $\mathbf{B}$, $\mathbf{C}$ be smooth real functions on M. Define the correlation function

$$\rho_{\mathbf{BC}}(t) = \int \rho(dx)\mathbf{B}(f^t x)\mathbf{C}(x) - \left[\int \rho(dx)\mathbf{B}(x)\right]\left[\int \rho(dx)\mathbf{C}(x)\right]$$

and its Fourier transform

$$\hat{\rho}_{\mathbf{BC}}(\omega) = \int_{-\infty}^{\infty} e^{i\omega t}\rho_{\mathbf{BC}}(t)\,dt$$

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[1] The basic set Λ is nontrivial if it is not a fixed point or a periodic orbit.