GRADUATE TALK

Wave trace invariants and the inverse spectral problem

The purpose of this talk is to introduce the trace of the wave group on a Riemannian manifold or a bounded domain. I will then define the wave trace invariants and explain how they have been (or can be) used to help solve the inverse spectral problem.

COLLOQUIUM I

The inverse spectral problem for analytic plane domains, I

This talk (and its sequel) concern the well-known problem of M. Kac: Can you hear the shape of a drum? I will discuss this problem in the special case of simply connected analytic plane domains. I will assume further that the domains have a mirror symmetry along a "bouncing ball orbit" of a fixed length L. The main result I will describe is the following: A mirror symmetric analytic plane domain is determined by its Dirichlet (or Neumann) eigenvalues among other such domains.

COLLOQUIUM II

The inverse spectral problem for analytic plane domains, II

In this talk I will give more details on the proof of the theorem discussed in the previous talk. There are three main steps in the proof: (i) The construction of a good approximation for the wave group or resolvent; (ii) The calculation of wave trace invariants around a bouncing ball orbit using Feynman diagrams and amplitudes; (iii) Determining the domain from these wave trace invariants.