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Computation of Eigenvalues, Spectral Zeta Functions and Zeta-Determinants on Hyperbolic Surfaces

Résumé/Abstract:
Part 1 - Method of Particular Solutions. I will explain the method of particular solutions and how it can be used to compute eigenvalues of the Laplace operator on Riemannian manifolds. I will demonstrate this on hyperbolic surfaces and show how eigenvalues can be computed with very high accuracy in this case.

Part 2 - Computations of Spectral Invariants. I will describe how a combination of analytic and numerical tools can be used to compute spectral invariants such as the spectral Zeta function and the Zeta regularized determinant of the Laplace operator. I will also demonstrate some ways how regularized Weyl laws can be useful for numerical computations.

Part 3 - Dirichlet-to-Neumann map. I will discuss the Dirichlet-to-Neumann map for Riemannian manifolds with boundary and how it can be used to find resonances for non-compact manifolds.