A Numerical Study of Eigenvalues of the Hyperbolic Laplacian for Polyhedra with One Cusp

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Abstract

Let $\mathbb{H}_3$ be three-dimensional hyperbolic space and Γ a group of isometries of $\mathbb{H}_3$ that acts discontinuously on $\mathbb{H}_3$ and that has a fundamental domain of finite hyperbolic volume. The Laplace operator $-\Delta$ of $\mathbb{H}_3$ gives rise to a positive, essentially selfadjoint operator on $L^2(\Gamma\backslash\mathbb{H}_3)$. The nature of its discrete spectrum is still not well understood if Γ is not cocompact.

This paper contains a report on a numerical study of the discrete spectrum of Γ for various noncocompact groups Γ. Particularly interesting are the results for some nonarithmetic groups Γ.