Spectral Geometry
Géométrie spectrale
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Small eigenvalues of degenerating Riemann surfaces

It is known that the small eigenvalues of the Laplacian of a Riemann surface close to the boundary of the modular space can be well approximated by the eigenvalues of the discrete Laplacian on a certain graph coming from the pair of pants decomposition of the surface. We provide a complete description of the sets of eigenvalues of the weighted graph Laplacian for all graphs on four vertices that correspond to a valid pair of pants decomposition of a surface of genus 3.

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A Sharp Diameter-Dependent Lower Bound for the First Nonzero Neumann Eigenvalue of Geodesic Triangles in Space Forms

We prove a sharp lower bound for the first nonzero Neumann eigenvalue of geodesic triangles of given diameter in two-dimensional space forms. The bound is given by the first positive radial Neumann eigenvalue of a one dimensional model; it is approached by degenerating isosceles triangles. When $K > 0$ and $D = \pi/(2\sqrt{K})$, equality is attained precisely by birectangular triangles. We also prove a hot-spots theorem for non-acute spherical triangles of diameter at most $\pi/2$, and establish antisymmetry and eigenvalue monotonicity for isosceles spherical triangles of diameter $\pi/2$. This is a joint work with Shoo Seto and Yusen Xia.