Maximal and minimal localization of Laplacianeigenfunctions in a given subdomain

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Abstract

It is well known that for some planar domains, some of the Laplacianeigenfunctions are localized in a small region of the domain and decayrapidly outside this region. We address a shape optimization problem of minimizingor maximizing the L2 norm of the eigenfunctions in some sub-domains.This problem is solved by a numerical method involving the Method of FundamentalSolutions and Hadamard shape derivatives. We use the adjoint methodfor a fast calculation of the shape gradient. Several numerical simulations illustratethe good performance of the method.