Stability results for the N-dimensional Schiffer conjecture via a perturbation method

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Abstract Given a eigenvalue μ_{0m}^2 of $-\Delta$ in the unit ball B_1, with Neumann boundary conditions, we prove that there exists a class $\mathcal{D}$ of $C^{0,1}$-domains, depending on μ_{0m}, such that if u is a no trivial solution to the following problem $\Delta u + \mu u = 0$ in Ω, $u = 0$ on $\partial\Omega$, and $\int\limits_{\partial\Omega} \partial_{\mathbf{n}} u = 0$, with $\Omega \in \mathcal{D}$, and $\mu = \mu_{0m}^2 + o(1)$, then Ω is a ball. Here μ is a eigenvalue of $-\Delta$ in Ω, with Neumann boundary conditions.