Asymptotic behaviour and numerical approximation of optimal eigenvalues of the Robin Laplacian

Pedro R. S. Antunes, Pedro Freitas, James B. Kennedy

(Submitted on 3 Apr 2012)

We consider the problem of minimising the $n^{th}-$eigenvalue of the Robin Laplacian in $\mathbb{R}^{N}$. Although for $n=1,2$ and a positive boundary parameter α it is known that the minimisers do not depend on α, we demonstrate numerically that this will not always be the case and illustrate how the optimiser will depend on α. We derive a Wolf-Keller type result for this problem and show that optimal eigenvalues grow at most with $n^{1/N}$, which is in sharp contrast with the Weyl asymptotics for a fixed domain. We further show that the gap between consecutive eigenvalues does go to zero as n goes to infinity. Numerical results then support the conjecture that for each n there exists a positive value of α_{n} such that the $n^{\rm th}$ eigenvalue is minimised by n disks for all $0<\alpha<\alpha_{n}$ and, combined with analytic estimates, that this value is expected to grow with $n^{1/N}$.

Subjects:	**Spectral Theory (math.SP)**
MSC classes:	35P15, 35J05, 49Q10, 65N25
Cite as:	**arXiv:1204.0648v1 [math.SP]**

Submission history

From: Pedro Antunes [view email]
[v1] Tue, 3 Apr 2012 10:26:54 GMT (1138kb)