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*Eigenvalues of the biharmonic operator with density*

**Abstract**

We consider the eigenvalues of the biharmonic operator subject to Neumann boundary conditions and with a positive density $\rho$ on a domain $\Omega$ of the Euclidean space $\mathbb{R}^N$, namely problem

$$\begin{cases} \Delta^2 u = \lambda \rho u, & \text{in } \Omega, \\ \frac{\partial^2 u}{\partial \nu^2} = \operatorname{div}_{\partial\Omega}\left(D^2 u \cdot \nu\right) + \frac{\partial \Delta u}{\partial \nu} = 0, & \text{on } \partial\Omega. \end{cases}$$

We study the dependence of the eigenvalues upon the density $\rho$ and the domain $\Omega$ under the constraint $\int_\Omega \rho dx = |\Omega|$. We prove uniform upper bounds which respect the Weyl's law for all the Neumann eigenvalues in dimension $N \geq 4$ by exploiting a technique developed in [2, 3] and recently used to prove upper bounds for the eigenvalues of the Laplacian on manifolds (see e.g., [1]). Finally, we shall provide some remarks on the case $N = 2, 3$, on Dirichlet or intermediate conditions, on extensions to polyharmonic operators and on extension to manifolds. Based on a joint work with Prof. Bruno Colbois.

Bibliography

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