

The eigenvalue problem for the 1-biharmonic operator

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Abstract. We consider the problem of finding the optimal constant for the embedding of the space

$$W_{\Delta}^{2,1}(\Omega) := \left\{ u \in W_0^{1,1}(\Omega) \mid \Delta u \in L^1(\Omega) \right\}$$

into the space $L^1(\Omega)$, where $\Omega \subseteq \mathbb{R}^n$ is a bounded convex domain, or a bounded domain with boundary of class $C^{1,\alpha}$. This is equivalent to finding the first eigenvalue of the 1-biharmonic operator under (generalized) Navier boundary conditions. In this paper we provide an interpretation for the eigenvalue problem, we show some properties of the first eigenfunction, we prove an inequality of Faber-Krahn type, and we compute the first eigenvalue and the associated eigenfunction explicitly for a ball, and in terms of the torsion function for general domains.

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