SPECTRAL ESTIMATES OF THE p-LAPLACE NEUMANN OPERATOR IN PLANAR DOMAINS

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The p-Laplace operator

$$\Delta_p u = \operatorname{div}(|\nabla u|^{p-2}\nabla u)$$

arises in study of porous media flows ($p = 3/2$) and in study of vibrations of nonelastic membranes (p>2).

We obtain lower estimates of the first non-trivial Neumann eigenvalue of the p-Laplace operator in a large class of planar domains $\Omega \subset \mathbb{R}^2$. The suggested approach is based on universal two-weight Poincaré-Sobolev inequalities with (quasi)conformal weights and its non weighted version for (quasi)conformal α-regular domains. The main technical tool is the geometric theory of composition operators in relation with the Brennan's Conjecture for (quasi)conformal mappings.

(Joint work with Vladimir Gol'dshtein and Valerii Pchelintsev)

References

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