

Eigenvalues of free plates

Davide Buoso

Universidade de Lisboa
Grupo de Física Matemática
Campo Grande, Edifício C6, 1749-016 Lisboa (Portugal)
Phone: (+351) 21 750 0746
Email: dbuoso@fc.ul.pt
Webpage: <http://dbuoso.altervista.org/>

Abstract: In this talk we consider the eigenvalues of the biharmonic operator subject to Neumann and Steklov boundary conditions. These problems arise in the study of free vibrating plates within the so-called Kirchhoff-Love model. Similarly to the case of the Laplace operator, we show that these two problems are strictly related via mass concentration arguments. Then we compute Hadamard-type formulas for the shape derivatives of the eigenvalues and use them to prove that balls are critical domains for all the eigenvalues under volume constraint. Finally, in the case of zero Poisson ratio, we prove sharp quantitative isoperimetric inequalities and, as a corollary, that the ball maximizes the first non-zero eigenvalues among domains with the same volume. Based on the papers [1, 2, 3, 4].

References

- [1] D. Buoso, *Analyticity and criticality results for the eigenvalues of the biharmonic operator*, Geometric Properties for Parabolic and Elliptic PDE's, Springer, 2016.
- [2] D. Buoso, L.M. Chasman, L. Provenzano, *On the stability of some isoperimetric inequalities for the fundamental tones of free plates*, J. Spectr. Theory, to appear.
- [3] D. Buoso, L. Provenzano, *A few shape optimization results for a biharmonic Steklov problem*, J. Differential Equation, 259 (2015), no. 5, 1778-1818.
- [4] D. Buoso, L. Provenzano, *On the eigenvalues of a biharmonic Steklov problem*, in: Integral Methods in Science and Engineering: Theoretical and Computational Advances, Birkhäuser, 2015.