

On Steklov-type eigenvalues for the Laplace and the biharmonic operator

Pier Domenico Lamberti

University of Padova, Italy

Abstract: Broadly speaking, an eigenvalue appearing in the boundary conditions of an elliptic operator is an eigenvalue of Steklov-type. Indeed, the classical Steklov problem reads

$$\begin{cases} \Delta u = 0, & \text{in } \Omega, \\ \frac{\partial u}{\partial \nu} = \lambda u, & \text{on } \partial\Omega, \end{cases}$$

where ν denotes the unit outer normal to the boundary of a smooth bounded open set Ω in $\mathbb{R}^N$.

In this talk we shall discuss a few variants of such problem. In particular, we shall formulate the natural fourth order Steklov problem which involves the biharmonic operator, providing a physical justification.

Shape optimization problems will be addressed and an isoperimetric inequality for the first eigenvalue of the above mentioned biharmonic Steklov problem will be presented.

We shall also point out that a class of Steklov-type problems could be viewed as a class of critical Neumann-type problems arising in boundary mass concentration phenomena.

This talk is based on joint works with Davide Buoso, Alberto Ferrero, and Luigi Provenzano.