Shape differentiability of the eigenvalues of the biharmonic operator

Davide Buoso\textsuperscript{1}, Pier Domenico Lamberti\textsuperscript{2}, and Luigi Provenzano\textsuperscript{2}

\textsuperscript{1}Dipartimento di Scienze Matematiche, Politecnico di Torino – Corso Duca degli Abruzzi, 24 - 10129 Torino, Italy
\textsuperscript{2}Dipartimento di Matematica, Universita’ degli Studi di Padova – Via Trieste, 63 - 35121 Padova, Italy

Abstract

In this poster we will present some old and new results concerning the shape differentiability of the eigenvalues of the biharmonic operator subject to different homogeneous boundary conditions. After having recalled the problems under consideration (Dirichlet, Neumann, intermediate and Steklov boundary value problems), we will show that all the elementary symmetric functions of the eigenvalues are real analytic. Then we provide Hadamard-type formulas for all the above mentioned problems. Finally, after having recalled the known results in eigenvalue shape optimization, we will show how to use the Hadamard-type formulas to prove that the ball is a critical domain under volume constraint for any elementary symmetric function of the eigenvalues, and for all the problems considered. Based on joint works with P.D. Lamberti and L. Provenzano.

\textsuperscript{*}Speaker