

NONLINEAR HIGHER-ORDER EIGENVALUE PROBLEMS:  
POSITIVITY OF FIRST EIGENFUNCTIONS AND VALIDITY OF THE  
FABER-KRAHN INEQUALITY

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Higher-order eigenvalue problems are known to present some additional difficulties with respect to their second-order counterparts. The lack of a maximum principle does not allow to conclude that first eigenfunctions are positive (or negative), and indeed they can be sign-changing in some cases. Similarly, standard symmetrization techniques can not be applied, so that it is not easy to identify the domain which minimizes the first eigenvalue under a volume constraint. In this talk we will present some results about the minimization of the  $L^1$  (resp. the  $L^\infty$ ) norm of the Laplacian among functions with fixed  $L^1$  (resp.  $L^\infty$ ) norm, which amounts to find the first eigenvalue of some nonlinear higher-order differential operators. In particular, we will present results about the positivity of first eigenfunctions, and the validity of the Faber-Krahn inequality, namely, when the domain which minimizes the first eigenvalue under a volume constraint is the ball.

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