Optimizing the principal eigenvalue for some weighted Neumann Problems

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Abstract

We study the positive principal eigenvalue of a weighted problem associated with the Neumann Laplacian. This analysis is related to the investigation of the survival threshold in population dynamics. When trying to minimize such eigenvalue with respect to the weight, one is lead to consider a shape optimization problem, which is known to admit spherical optimal shapes only in very specific cases. We investigate whether spherical shapes can be recovered in general situations, in some singular perturbation limit. In the case of planar polygons domains, we show quantitative estimates of the optimal level convergence, as well as of the involved eigenvalues. We will also study the optimization analysis with respect to diffusion. These are joint works with Dario Mazzoleni (Università di Pavia) and Gianmaria Verzini (Politecnico di Milano).

References

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*Partially supported by ERC project Advanced Grant 2013 n. 339958: "Complex Patterns for Strongly Interacting Dynamical Systems - COMPAT" PRIN-2015KB9WPT Grant: "Variational methods, with applications to problems in mathematical physics and geometry", by the INdAM-GNAMPA group. e-mail: benedetta.pellacci@unicampania.it