
ON THE MAXIMIZATION OF THE FIRST (NON TRIVIAL) NEUMANN EIGENVALUE OF THE LAPLACIAN UNDER PERIMETER CONSTRAINT

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In this talk I will present some recent results obtained in collaboration with A. Henrot and A. Lemenant (both in Nancy, France), on the maximization of the first (non trivial) Neumann eigenvalue, under perimeter constraint, in dimension 2. Without any further assumption, the problem is trivial, since the supremum is $+\infty$. On the other hand, restricting to the class of convex domains, the problem becomes interesting: the maximum exists, but neither its value nor the optimal shapes are known. In 2009 R.S. Laugesen and B.A. Siudeja conjectured that the maximum among convex sets should be attained at squares and equilateral triangles. We prove that the conjecture is true for convex planar domains having two axes of symmetry.