

Meeting on Computational and Analytic Problems in Spectral Theory

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Abstract of Talk

ON PÓLYA'S INEQUALITY FOR TORSIONAL RIGIDITY AND FIRST DIRICHLET EIGENVALUE

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Let Ω be an open set in Euclidean space with finite Lebesgue measure $|\Omega|$. We obtain some properties of the set function $F : \Omega \mapsto \mathbb{R}^+$ defined by

$$F(\Omega) = \frac{T(\Omega)\lambda_1(\Omega)}{|\Omega|},$$

where $T(\Omega)$ and $\lambda_1(\Omega)$ are the torsional rigidity and first eigenvalue of the Dirichlet Laplacian respectively. We improve the classical Pólya bound

$$F(\Omega) \leq 1,$$

and show that for convex sets in \mathbb{R}^2 ,

$$F(\Omega) \leq 1 - \frac{1}{13000}.$$

For any $\epsilon \in (0, 1)$ we construct an open set Ω_ϵ such that $F(\Omega_\epsilon) \geq 1 - \epsilon$. This is joint work with V. Ferone, C. Nitsch, C. Trombetti.