SEMINÁRIO DE EQUAÇÕES DIFERENCIAIS

A Faber-Krahn inequality for solutions of Schrödinger's equation on Riemannian manifolds

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Resumo: We consider a bounded open set with smooth boundary $\Omega \subset M$ in a Riemannian manifold (M, g), and suppose that there exists a non-trivial function $u \in C(\overline{\Omega})$ solving the problem

$$-\Delta u = V(x)u, \text{ in } \Omega,$$

in the distributional sense, with $V \in L^{\infty}(\Omega)$, where $u \equiv 0$ on $\partial\Omega$. We prove a sharp inequality involving $||V||_{\infty}$ and the first eigenvalue of the Laplacian on geodesic balls in simply connected spaces with constant curvature, which slightly generalizes the well known Faber-Krahn isoperimetric inequality. Moreover, in a Riemannian manifold which is not necessarily simply connected, we obtain a lower bound for $||V||_{\infty}$ in terms of its isoperimetric constant. As an application, we show that if Ω is a very "small" domain then the problem above has no non-trivial solution.