Seminário de Geometria

Estimates for the First Eigenvalue of the Bi-Drifting Laplacian

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Abstract. Let $(M, \langle , \rangle)$ be an n-dimensional compact Riemannian manifold with boundary (possibly empty), $\Phi \in C^2(M)$, $d\mu = e^{-\Phi}dv$ where dv is the Riemannian volume measure on $(M, \langle , \rangle)$. The drifting Laplacian with respect to the weighted volume measure μ is given by

$$L_\Phi = \Delta - \langle \nabla \Phi, \nabla(.) \rangle.$$

The operators L_Φ and L_Φ^2 are self-adjoint on the space of smooth functions on M vanishing on ∂M with respect to the inner product

$$\langle\langle f, g \rangle\rangle = \int_M f g \, d\mu.$$

Therefore, the eigenvalue problem

$$\begin{cases} L_\Phi u &= -\lambda u \,\text{in}\, M, \\ u|_{\partial M} &= 0 \end{cases}$$

has a real and discrete spectrum:

$$0 < \lambda_1 \leq \lambda_2 \leq \cdots \leq \lambda_k \leq \cdots \to +\infty.$$

In recent years, many interesting estimates for eigenvalues of the drifting Laplacian have been obtained by Li, Ma and Du, among others. We'll consider four kinds of eigenvalue problems of the bi-drifting Laplacian operator on compact manifolds with boundary, with a condition in weight Ricci curvature (or Bakry- Emery Ricci curvature). Our objective is to estimate the first eigenvalue of these operators. The first two results in this direction concern the clamped and the buckling problem.