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Summary: Let $\Delta \varphi = \Delta - \nabla \varphi \nabla$ be a symmetric diffusion operator with an invariant weighted volume measure $d\mu = e^{-\varphi}d\nu$ on an $n$-dimensional compact Riemannian manifold $(M, g)$, where $g = g(t)$ solves the extended Ricci flow. We study the evolution and monotonicity of the first nonzero eigenvalue of $\Delta \varphi$ and we obtain several monotone quantities along the extended Ricci flow and its volume preserving version under some technical assumption. We also show that the eigenvalues diverge in a finite time for $n \geq 3$. Our results are natural extensions of some known results for Laplace-Beltrami operators under various geometric flows.

MSC:

53C21 Methods of global Riemannian geometry, including PDE methods; curvature restrictions
53C44 Geometric evolution equations (mean curvature flow, Ricci flow, etc.) (MSC2010)
35P30 Nonlinear eigenvalue problems and nonlinear spectral theory for PDEs
58J35 Heat and other parabolic equation methods for PDEs on manifolds

Keywords: Witten-Laplacian; eigenvalues; Ricci flow; monotonicity; curvature

Full Text: DOI arXiv

References:


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