

Pointwise Characterizations of Curvature and Second Fundamental Form on Riemannian Manifolds

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Abstract: Let M be a complete Riemannian manifold possibly with a boundary M . For any C^1 -vector field Z , by using gradient/functional inequalities of the (reflecting) diffusion process generated by $L := \Delta + Z$, pointwise characterizations are presented for the Bakry-Emery curvature of L and the second fundamental form of M if exists. These extend and strengthen the recent results derived by A. Naber for the uniform norm $\|\mathbf{Ric}_Z\|_\infty$ on manifolds without boundary. A key point of the present study is to apply the asymptotic formulas for these two tensors found by the first named author, such that the proofs are significantly simplified. This is a joint work with Professor Fengyu Wang.

References

- [1] A. Naber. Characterizations of bounded Ricci curvature on smooth and nonsmooth spaces, arXiv: 1306.6512v4.
- [2] F.-Y. Wang (2014). Analysis for diffusion processes on Riemannian manifolds, World Scientific.
- [3] F.-Y. Wang (2009). Second fundamental form and gradient of Neumann semigroups, *J. Funct. Anal.*, **256**, 3461–3469.
- [4] S.Z. Fang, B. Wu. Remarks on spectral gaps on the Riemannian path space, arXiv: 1508.07657.