A commutator formula and geodesic flows on manifolds of nonpositive curvature

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Abstract

In this talk we like to discuss a new commutator formula on the tangent bundle of a Riemannian manifold. We will apply this formula to geodesic flows on compact manifolds of nonpositive curvature. In particular, we show that each smooth function invariant with respect to the geodesic flow is invariant under parallel translations. We extend this result to all L^2 functions on the unit tangent bundle, which have a fiberwise decomposition into an arbitrary but finite number of spherical harmonics. If the geometric rank is one, those functions have to be constant almost everywhere.