

Ricci Almost Solitons on semi-Riemannian Warped Products

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Abstract. We characterize Ricci almost solitons on semi-Riemannian warped products, considering the potential function to depend on the fiber or not. We show that the fiber is necessarily an Einstein manifold. As a consequence of our characterization we prove that when the potential function depends on the fiber, if the gradient of the warping function does not act by translations then the base and the warped product are also Einstein manifolds. Moreover, we show the existence of conformal vector fields on the base, the fiber and on the warped product. Assuming completeness of the warped product we provide a classification of such manifolds. When the potential function depends on the fiber and the gradient of the warping functions is an improper vector field, we show that the base is a Brinkmann space and the fiber is Ricci flat. The proofs rely heavily on an important decomposition property of the potential function in terms of functions which depend on the basis or on the fiber. As an application of the characterization we also prove that the potential function of a complete Ricci soliton depends only on the base. Joint work with Keti Tenenblat.