

Homogeneity of gradient Ricci soliton metrics

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A Riemannian homogeneous gradient Ricci soliton metric is either Einstein or a product of an Einstein manifold and an Euclidean space so that the resulting soliton structure is rigid. We explore two extensions of this rigidity result as follows. Firstly we consider Riemannian gradient Ricci solitons with constant scalar curvature and show how rigidity of the soliton structure follows from this assumption. Secondly we consider Lorentzian homogeneous gradient Ricci solitons, with special attention to the irreducible but not idecomposable ones. A complete classification is available in low dimensions.