Ricci Solitons and Geometry of Four-dimensional Non-reductive Homogeneous Spaces

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Abstract. We study the geometry of non-reductive 4-dimensional homogeneous spaces. In particular, after describing their Levi-Civita connection and curvature properties, we classify homogeneous Ricci solitons on these spaces, proving the existence of shrinking, expanding and steady examples. For all the non-trivial examples we find, the Ricci operator is diagonalizable.