

Compact Einstein G_2 -manifold with closed fundamental form

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Abstract

We give an answer to a question posed recently by R. L. Bryant, namely we show that a compact 7-dimensional manifold equipped with a G_2 -structure with closed fundamental form is Einstein if and only if the Riemannian holonomy of the induced metric is contained in G_2 . This could be considered to be a G_2 analogue of the Goldberg conjecture in almost Kähler geometry. The result was generalized by R. L. Bryant to closed G_2 -structures with too tightly pinched Ricci tensor. We extend it in another direction proving that a compact G_2 -manifold with closed fundamental form and divergence-free Weyl tensor is a G_2 -manifold with parallel fundamental form.