Название публикации:

Associated left-invariant contact metric structures on the 7-dimensional heisenberg group H 7

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Аннотация:

In this paper, we construct new nonstandard associated left-invariant contact metric structures (η,ξ,φ,g λ) on the 7-dimensional Heisenberg group H 7 . The associated left-invariant contact metric structures for the contact structure η on the contact Lie group (H 7 ,η) were given by the affinor φ and the (pseudo-)Riemannian metric g x such that (Equation presented) where J is an almost complex structure compatible with the restriction of g λ on ker η, g λ | kerη . The parameter λ provided deformation of the associated metric g λ along the Reeb field ξ. The affinor (Equtation presented) and the metric (Equtation presented) are fixed. The new affinors φ=φ0(Id+P)(Id-P) -1 are given by an operator P: L(H 7) → L(H 7) such that P(ξ) = 0 and (Equtation presented) (Equtation presented), and (Equtation presented) are symmetric matrices; u, v, s, t, k, l, x, y, q, r, w, and z are real parameters. Each new affinor φ defines a new associated metric g λ by formula (1). We have considered some particular classes of associated metrics corresponding to the affinors φ which were given by the operators P of the following types (Equtation presented) The following theorem was received for any associated (pseudo-)Riemannian metric gλ(X, Y) = dη(φX, Y) + λη(X)η(Y). Theorem 1. Any left-invariant contact metric structure (η,ξφ,gλ) on the Heisenberg group H 7 is a Sasaki, K-contact, and η-Einstein structure. The squares of the norms of a Riemann tensor R and Ricci tensor Ric(X,Y) = g λ (A Ric X,Y) of associated left-invariant metric g λ have the following expressions: (Equtation presented) The Ricci operator has the following matrix: (Equtation presented) The sign of the scalar curvature of associated left-invariant metric g λ is not constant and (Equtation presented) In addition, the following theorem has been proved for any (2n+1)-dimensional Heisenberg group H 2n+1 with a given (pseudo-)Riemannian metric g 0 = e 1 ∗2 +⋯ + e 2n ∗2 + λe 2n+1 ∗2 . Theorem 2. A left-invariant contact metric structure (η,ξφ 0 ,g 0)on the Heisenberg group H 2n+1 is n-Einstein, and Ric g0 (X,Y) =-λ/2g 0 (X,Y)+ (n+λ)λ/2η(X)η(Y),X,Y,∈L(H2n+1).

Ключевые слова:

Associated metric, Contact metric structures, Lie group