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ON A STRUCTURE DEFINED BY A TENSOR FIELD f_λ WITH COMPLIMENTED FRAMES SATISFYING $f^3 - \lambda^r f$

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Abstract

K Yano [5],has studies the structure defined by a tensor field f($\neq 0$) of type (1,1) satisfying $f^3 + f = 0$. In the present paper, we have defined and studied f_λ- structure. we have also obtained positive definite Riemannian metric with respect to which the complementary distribution areorthogonal

Keywords: Tensor field, covariant vector, contravariant vector, C^∞, n - dimensional manifold

1. Let M_n be an $n-$dimensional differentiable manifold of class C^∞ and let there be given a tensor field $f \neq 0$ of class C^∞such that

(1.1) $$f^3 - \lambda^r f = 0,\ 0 \le r \le n$$

where λ is non-zero number,r is an integer and is of constant rank s at each point of M, then f is called "f_λ-structure of rank s ", and M with f_λ-structure a "f_λ-manifold".

Theorem1.1: For a tensor field $f \neq 0$ satisfying (1.1), the operators

(1.2) $l = \left(\frac{f^2}{\lambda^r}\right)$, and $m = I - \left(\frac{f^2}{\lambda^r}\right)$

I denoting the identity operator, applied to the tangent space at a point of the manifold are complementary projection operators.

Proof: We have

$l + m = I$ and

$$l^2 = \left(\frac{f^2}{\lambda^r}\right)^2 = \frac{f^4}{\lambda^{2r}} = l,\ m^2 = \frac{f^4}{\lambda^{2r}} - 2\frac{f^2}{\lambda^r} + I = m$$

$lm = ml = 0$

by virtue of (1.1) which proves the theorem.