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ON M-PROJECTIVELY RECURRENT SASAKIAN MANIFOLDS

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Abstract: The object of this paper is to study M-projectively recurrent Sasakian manifolds.

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1. Introduction

Let $M^{2m+1}(\varphi, \xi, \eta, g)$ be a contact metric manifold with contact from η, the associated vector field ξ, (1,1)-tensor field φ and the associated Riemannian metric g. If ξ is a Killing vector field, then M^{2m+1} is called a K-contact Riemannian manifold [1,3]. A K-contact Riemannian manifold is called Sasakian [1] if and only if

$$(\nabla_X \varphi)(Y) = g(X, Y)\xi - \eta(Y)X \tag{1.1}$$

holds for all vector fields X, Y, where ∇ denotes the operator of covariant differentiation with respect to g. A Sasakian manifold is K-contact but not conversely. However, a 3-dimensional K-contact manifold is Sasakian.

Recently, R. H. Ojha [2] studied M-projectively flat Sasakian manifold and proved that an M-projectively recurrent Sasakian manifold is M-projectively flat if and only if it is an Einstein manifold. In the present paper we study M-projectively recurrent Sasakian manifolds and it is proved that such a manifold is always an Einstein manifold and hence M-projectively flat.

2. Preliminaries

If R, S, r denote respectively the curvature tensor of type (1,3), the Ricci tensor of type (0,2) and the scalar curvature of a Sasakian manifold M^{2m+1}, then the following relations hold [1,3,4]:

$$\text{a)} \quad \varphi\xi = 0, \qquad \text{b)} \quad \eta(\xi) = 1, \quad c) \quad g(X, \xi) = \eta(X), \tag{2.1}$$