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GEOMETRICAL STUDY OF PSEUDO-SLANT SUBMANIFOLDS OF A KENMOTSU MANIFOLD

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Abstract. We tried here to make a geometric view of pseudo-slant submanifolds of a Kenmotsu manifold. We verify some properties of the components of the tensor field acting on that kind of submanifold and find out the necessary and sufficient conditions for them to be parallel. We also study how the components affect the nature of the manifold. The necessary conditions for the submanifold to be mixed geodesic and totally geodesic are given.

Key words: Kenmotsu manifold, pseudo-slant submanifold, mixed geodesic, totally geodesic.

Subject Classification [2010]: 53C15, 53C25.

1. Introduction. B.Y.Chen in 1990 initiated the study of slant submanifolds of an almost Hermitian manifold as a natural generalization of both holomorphic and totally real submanifolds (Chen, 1990). In 1994, N. Papaghiuc (1994) introduced semi-slant submanifolds in an almost Hermitian manifold, which includes the class of proper CR-submanifolds and slant submanifolds. A. Lotta (1996) extended the idea of slant immersions in the setting of almost contact metric manifold in 1996. Then several works have been done on these submanifolds in various known spaces.

As a special case of bi-slant submanifolds, Carriazo (2002) first introduced the notion of pseudo-slant submanifolds of an almost Hermitian manifold. Then in 2007, the contact version of pseudo-slant submanifolds was defined and studied by V.A. Khan and M.A. Khan (2007). The idea of such submanifolds in $(LCS)_n$- manifolds was elaborated by M. Atceken and S.K. Hui (2013) in 2013. Recently M. Atceken with S. Dirik has worked on the geometry of pseudo-slant submanifolds of Kenmotsu manifold and Cosymplectic manifold (Atceken and Dirik, 2014 and Dirik and Atceken 2016).

2. Preliminaries. Let $\tilde{M}^{(2n+1)}(\phi, \xi, \eta, \tilde{g})$ be an almost contact Riemannian manifold where ϕ is a tensor field of type $(1,1)$, ξ is a vector field and η is a 1-form and $\tilde{g}$ is the induced Riemannian metric on $\tilde{M}$ satisfying

$$\eta \circ \phi = 0, \quad \phi\xi = 0, \quad \eta(\xi) = 1, \tag{2.1}$$

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