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Vaisman-Gray Manifold of Pointwise Holomorphic Sectional Conharmonic Tensor

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Abstract. The purpose of the present paper is to discuss the geometrical properties of the Vaisman-Gray manifold (VG-manifold) of a pointwise holomorphic sectional conharmonic tensor (PHT-tensor). Furthermore, the necessary and sufficient conditions required for the VG-manifold to admit such a PHT-tensor have been determined. In particular, under certain conditions, we have established that the aforementioned manifold was an Einstein manifold.

1. Introduction

The classification of the almost Hermitian structures was introduced by Gray and Hervella [4]. These structures have been categorized into sixteen different classes. Moreover, it has been found that the condition for each one of them depends on a Kozel's operator method [15].

On the other hand, there is another significant classification method for the almost Hermitian structures that were introduced by Kirichenko. This method depends on the principle fibre bundle space of all complex frames of a smooth manifold M with the unitary structure group $U(n)$. This space is called an adjoined G-structure space. For further information, refer to the following citations: [3], [8], [9], [10], and [11].

One of the interesting classes of almost Hermitian structures is a VG-manifold, which is denoted by $W_1 \oplus W_4$, where W_1 and W_4 denote the nearly Kähler manifold and the locally conformal Kähler manifold, respectively.

It is a well-known fact that the harmonic function is one whose Laplacian vanishes. In general, it is not a conformal transformation harmonic function. With

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