

GENERALIZED TANAKA-WEBSTER AND LEVI-CIVITA
CONNECTIONS FOR NORMAL JACOBI OPERATOR
IN COMPLEX TWO-PLANE GRASSMANNIANS

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Abstract. We study classifying problems of real hypersurfaces in a complex two-plane Grassmannian $G_2(\mathbb{C}^{m+2})$. In relation to the generalized Tanaka-Webster connection, we consider that the generalized Tanaka-Webster derivative of the normal Jacobi operator coincides with the covariant derivative. In this case, we prove complete classifications for real hypersurfaces in $G_2(\mathbb{C}^{m+2})$ satisfying such conditions.

Keywords: real hypersurface; complex two-plane Grassmannian; Hopf hypersurface; Levi-Civita connection; generalized Tanaka-Webster connection; normal Jacobi operator

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1. INTRODUCTION

In complex projective spaces or in quaternionic projective spaces, many differential geometers studied real hypersurfaces with parallel curvature tensor ([7], [13]). From a new perspective, it is investigated to classify real hypersurfaces in complex two-plane Grassmannians with parallel normal Jacobi operator, that is, $\nabla \bar{R}_N = 0$ (see [5], [6], [12]).

As a prevailing notion, in a Riemannian manifold (\bar{M}, \bar{g}) , a vector field X along a geodesic γ of \bar{M} is called a *Jacobi field* if it satisfies the following second order Jacobi equation

$$\bar{\nabla}_{\dot{\gamma}}^2 X + \bar{R}(X, \dot{\gamma})\dot{\gamma} = 0,$$

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