Geometry,
Integrability
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LORENTZIAN SUBMANIFOLDS IN SEMI-EUCLIDEAN SPACES WITH POINTWISE 1-TYPE GAUSS MAP

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Abstract. In this work first, we survey the most recent classification results for submanifolds with pointwise 1-type Gauss map. Then, we study a class of hypersurfaces with vanishing Gauss-Kronecker curvature in terms of type of their Gauss map.

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1. Introduction

After the problem "*To what extent does the type of the Gauss map of a submanifold of $\mathbb{E}_r^m$ determine the submanifold?*" was introduced by Chen and Piccinni in [10], submanifolds with pointwise 1-type Gauss map have been worked in many articles, [8–10]. We present a survey of recent results on this topic in Section 3.

Consider an oriented (semi-)Riemannian submanifold M of a (semi-)Euclidean space and its Gauss map G. By the definition, M is said to have pointwise 1-type Gauss map if the Laplacian of its Gauss map take the form

$$\Delta G = f(G + C) \tag{1}$$

for a smooth function f and constant vector C. More precisely, a pointwise 1-type Gauss map is called *of the first kind* if (1) is satisfied for $C = 0$, and *of the second kind* if $C \neq 0$. Moreover, if (1) is satisfied for a non-constant function f, then M is said to have *proper* pointwise 1-type Gauss map. Otherwise, G is said to be (global) 1-type, [8, 13].