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MERIDIAN SURFACES OF PARABOLIC TYPE IN THE FOUR-DIMENSIONAL MINKOWSKI SPACE

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Abstract. We construct a special class of spacelike surfaces in the Minkowski 4-space which are one-parameter systems of meridians of the rotational hypersurface with lightlike axis and call these surfaces meridian surfaces of parabolic type. They are analogous to the meridian surfaces of elliptic or hyperbolic type. Using the invariants of these surfaces we give the complete classification of the meridian surfaces of parabolic type with constant Gauss curvature or constant mean curvature. We also classify the Chen meridian surfaces of parabolic type and the meridian surfaces of parabolic type with parallel normal bundle.

MSC: 53A35, 53A55, 53A10
Keywords: Chen surfaces, constant Gauss curvature, constant mean curvature, parallel normal bundle, meridian surfaces in Minkowski space

1. Introduction

A fundamental problem of the contemporary differential geometry of surfaces in the Euclidean space $\mathbb{R}^n$ or the pseudo-Euclidean space $\mathbb{R}^n_k$ is the investigation of the basic invariants characterizing the surfaces. Our aim is to investigate various important classes of surfaces in the four-dimensional Minkowski space $\mathbb{R}^4_1$ characterized by conditions on their invariants.

In [6] we developed a local theory of spacelike surfaces in $\mathbb{R}^4_1$ based on the introducing of an invariant linear map γ of Weingarten-type in the tangent plane at any point of the surface. The map γ generates two invariant functions $k = \det\gamma$ and $\varkappa = -\frac{1}{2}\,\mathrm{tr}\gamma$. It turns out that the invariant $\varkappa$ is the curvature of the normal connection of the surface. The existence of principal lines at each point of a spacelike