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GEODESICS ON ROTATIONAL SURFACES IN PSEUDO-GALILEAN SPACE

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Abstract. In this paper, we study rotational surfaces in the pseudo-Galilean three-space $\mathbb{G}_3^1$ with pseudo-Euclidean rotations and isotropic rotations. In particular, we investigate properties of geodesics on rotational surfaces in $\mathbb{G}_3^1$ and give some examples.

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1. Introduction

Geodesics are curves in surfaces that plays a role analogous to straight lines in the plane. Geometrically, a geodesic in a surface is an embedded simple curve such that the portion of the curve between any two points is the shortest curve on the surface. A geodesic can be obtained as the solutions of the non-linear system of the second order ordinary differential equations (the Euler-Lagrange equations) with the given points and its tangent direction for the initial conditions. It is well-known that great circles are geodesics on a sphere. Also, meridians (lines), parallels (circles) and helices are geodesics on a circular cylinder. For more details about geodesics and some relative topics in Euclidean space, Minkowski space or simple isotropic space we refer to [1–3] and [5]. In this paper, we study geodesics on rotational surfaces in the pseudo-Galilean three-space.

2. Preliminaries

In 1872, F. Klein in his Erlangen program proposed how to classify and characterize geometries on the basis of projective geometry and group theory. He showed that the Euclidean and non-Euclidean geometries could be considered as spaces that are invariant under a given group of transformations. The geometry motivated by this approach is called a Cayley-Klein geometry. Actually, the formal definition of Cayley-Klein geometry is pair (G, H), where G is a Lie group and H is a closed

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