Hyperbolic Rotation Surfaces of Constant Mean Curvature in 3-de Sitter Space

Huili Liu[*]   Guili Liu

Dedicated to Professor Udo Simon on the Occation of his Sixtieth Birthday

Abstract

In the 4-dimensional Minkowski space $\mathbb{R}_1^4$, a surface is said to be a hyperbolic rotation surface, if it is a orbit of a regular curve under the action of the orthogonal transformations of $\mathbb{R}_1^4$ which leave a spacelike plane pointwise fixed. In this paper, we give the totally classification of the timelike and spacelike hyperbolic rotation surfaces in 3-dimensional de Sitter space $\mathbb{S}_1^3$.

Introduction.

In differential geometry, for the study of the surfaces theory in space forms, it is a very important and interesting problem to contruct or classify the constant mean curvature surfaces. Spacelike constant mean curvature hypersurfaces in arbitrary spacetime have interest in reletivity theory. They are convenient initial surfaces for the Cauchy problem and provide a time guage which is important in the study of singularities, the positivity of mass, and gravitational radiation.