The lightlike geometry of spacelike submanifolds in
Minkowski space

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Abstract

In [3] we have investigated an extrinsic differential geometry on spacelike submanifolds of codimension two in Lorentz-Minkowski space. Examples of codimension two spacelike submanifolds are given by hypersurfaces in Euclidean space, Hyperbolic space, spacelike hypersurfaces in Lorentz-Minkowski space and de Sitter space.

Recently, we have discovered a new geometry on submanifolds in Hyperbolic space which is now called the horospherical geometry in Hyperbolic space[2, 4]. The horospherical geometry is quite different from the hyperbolic geometry in Hyperbolic space. However, it has similar properties to the euclidean differential geometry[2]. For example, the Gauss-Bonnet type theorem holds for the horospherical Gauss-Kronecker curvature. Moreover, a part of geometric meanings for horo-tightness introduced in [1] have been recently clarified in the framework of the horospherical geometry[5, 6].

The lightlike geometry for spacelike submanifolds in Lorentz-Minkowski space not only unifies the euclidean Differential Geometry and the horospherical geometry in Hyperbolic space but also implies the theory of spacelike hypersurfaces in Lorentz-Minowski space and de Sitter space. In this talk, we start to explain the previous results on the lightlike geometry of codimension two spacelike submanifolds in Lorentz-Minowski space and give the framework for general spacelike submanifolds. One of the results is the Chern-Lashof type theorem for the lightlike total absolute curvature of spacelike submanifolds. Such a theorem naturally induces the notion of lightlike convexity and lightlike tightness etc.

References


