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Geometrical Properties of Surfaces Endowed with a Canonical Principal Direction in the 4-dimensional Euclidean Space

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Given a vector field X in a Riemannian manifold N, a hypersurface M of N is said to be endowed with a canonical principal direction (CPD) relative to X if the projection of X onto the tangent bundle of M gives a principal direction, [4].

It turns out that when N is a product space $\tilde{N}\times\mathbb{R}$ some interesting geometrical properties of hypersurfaces endowed with a canonical principal direction relative to ∂_t occur, where ∂_t is unit vector tangent to $\mathbb{R}$, [1–3]. When the ambient space is a product space, this notion was generalized in [5, 7] for submanifolds of arbitrary codimension.

In this talk, we would like to consider submanifolds with codimension more than one. First, we will discuss generalizations of the definition in the case of codimension one. Then, we are going to focus on surfaces in the Euclidean 4-space and present classification results that we recently obtain on surfaces endowed with CPD relative to a fixed direction. We would like to note that surfaces endowed with a CPD were classified in [6], where the ambient space N is Euclidean 3-space and X is a fixed direction.

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