

Contact and Squared Distance Function in the Geometry of Hypersurfaces in Four-Dimensional Euclidean Space

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Given a hypersurface immersed in the four-dimensional Euclidean space, three principal curvatures k_1 , k_2 , k_3 are well-defined, associated with the principal directions e_1 , e_2 , e_3 , respectively. In a neighborhood of a partially umbilic point, where two of the three principal curvatures coincide (say, $k_1 = k_2 \neq k_3$), the field of planes orthogonal to the direction e_3 is well-defined. The other principal directions, when well-defined, belong to these planes, and the contact of these planes with the set of partially umbilic points (which generically forms a curve) determines the generic conditions of the principal configurations studied in [reference]. In this talk, we study the geometry of hypersurfaces immersed in $\mathbb{R}^4$, analyzing the singularities of the squared distance function and relating them to the type of contact between the field of planes described above and the partially umbilic curve.

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