Uniqueness of complete spacelike hypersurfaces via their higher order mean curvatures in a conformally stationary spacetime

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ABSTRACT

This work corresponds to the paper [1]. We study complete noncompact spacelike hypersurfaces immersed into conformally stationary spacetimes, that is, Lorentzian manifolds endowed with a timelike conformal vector field V. In this setting, by using as main analytical tool a suitable maximum principle for complete noncompact Riemannian manifolds, we establish new characterizations of totally umbilical hypersurfaces in terms of their higher order mean curvatures. For instance, supposing an appropriated restriction on the norm of the tangential component of the vector field V, we are able to show that such hypersurfaces must be totally umbilical provided that either some of their higher order mean curvatures are linearly related or one of them is constant. Applications to the so-called generalized Robertson-Walker spacetimes are given. In particular, we extend to the Lorentzian context a classical result due to Jellett [2].

References

[1] Henrique F. de Lima and Marco A. L. Velásquez, *Uniqueness of complete spacelike hypersurfaces via their higher order mean curvatures in a conformally stationary spacetime*, Mathematische Nachrichten **287**, No. 11–12 (2014), 1223–1240.

[2] J. Jellett, *La surface dont la courbure moyenne est constant*, J. Math. Pures Appl. **18** (1853), 163–167.

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