

WORKSHOP ON SUBMANIFOLD THEORY AND GEOMETRIC ANALYSIS

UFSCAR, SÃO CARLOS, BRAZIL, AUGUST 05 – 09, 2019

THURSDAY- 14h - 14:40h -AUDITÓRIO DO DM

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Non-degenerate surfaces with the same Riemannian and Lorentzian mean curvature in a homogeneous space

ABSTRACT. Let us consider the family of homogenous 3-manifolds with isometry group of dimension 4, $\mathbb{E}(\kappa, \tau)$. As it is well known, such manifolds are Riemannian fibrations over a 2-dimensional space form, the fibers are geodesics and there exists a one-parameter family of translations along the fibers, generated by a Killing field ξ . With an analogous definition, but in the case where the Killing field ξ is timelike, we get the Lorentzian homogeneous spaces $\mathbb{L}(\kappa, \tau)$.

Therefore, any non-degenerate surface Σ in $\mathbb{L}(\kappa, \tau)$ can be endowed with two different (non-degenerate) metrics, the ones induced by $\mathbb{L}(\kappa, \tau)$ and $\mathbb{E}(\kappa, \tau)$. And, consequently, we can define two different mean curvature functions on Σ , H_L and H_R respectively. We study some geometric properties of surfaces in $\mathbb{L}(\kappa, \tau)$ such that $H_L = H_R$.

Specifically, we prove that in the case where $H_L = H_R = 0$ those surfaces are ruled surfaces. This result extends a previous one by Kobayashi in the case $\kappa = \tau = 0$ and by Kim, Koh, Shin and Yang when $\tau = 0$. Furthermore, in this last case ($\tau = 0$) we study some properties and give some uniqueness results for the general case where $H_L = H_R$ not necessarily constant.

The results presented in this talk are part of a joint work with M. Caballero and with F. R. dos Santos.

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