

Uniqueness and nonexistence of spacelike submanifolds with parallel mean curvature in semi-Euclidean spaces

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Abstract. Our purpose is to study different geometric properties of n -dimensional spacelike submanifolds immersed with a parallel mean curvature vector field (in abbreviation, PMC spacelike submanifolds) in an $(n + p)$ -dimensional semi-Euclidean space $\mathbb{R}_q^{n+p}$ of arbitrary index $q \in \{1, \dots, p\}$. Under suitable geometric constraints on the Ricci tensor, on the second fundamental form and, sometimes, on the behavior of volume growth, and some analytical conditions, such as Lebesgue integrability, stochastic completeness, parabolicity and convergence to zero at infinity, we apply some maximum principles on Riemannian manifolds in order to show that a PMC spacelike submanifold does not exist or must be either totally geodesic or totally umbilical. When $q = 1$ and $p \geq 2$, in the case of the Lorentz–Minkowski space $\mathbb{L}^{n+p}$, we present some versions of our results for trapped, marginally trapped or weakly trapped submanifolds. We also present some versions for the case $p = q = 1$, namely, for spacelike hypersurfaces in Lorentz–Minkowski space $\mathbb{L}^{n+1}$.

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