On the surfaces with the same mean curvature in the Euclidean 3-space and the Lorentz-Minkowski 3-space

Magdalena Caballero

Spacelike surfaces in the Lorentz-Minkowski 3-dimensional space $\mathbb{L}^3$ can be endowed with another Riemannian metric, the one induced by the Euclidean space $\mathbb{R}^3$. Those surfaces are locally the graph of a smooth function $u(x, y)$ satisfying $|Du| < 1$. If in addition they have the same mean curvature with respect to both metrics, they are the solutions to a certain partial differential equation, the $H_R = H_L$ surface equation.

It is well known that the only surfaces that are simultaneously minimal in $\mathbb{R}^3$ and maximal in $\mathbb{L}^3$ are open pieces of helicoids and of spacelike planes, [3].

In this talk we consider the general case of spacelike surfaces with the same mean curvature with respect to both metrics. We prove the existence of examples with non-zero mean curvature, we show geometric properties of these surfaces and we study the $H_R = H_L$ equation.

References

[1] A. L. Albujer and M. Caballero. Geometric properties of surfaces with the same mean curvature in R^3 and L^3. J. Math. Anal. Appl. 445, 2017.

[2] A. L. Albujer, M. Caballero and E. Sánchez. Some results for entire solutions to the $H_R = H_L$ surface equation. *Preprint.*

[3] O. Kobayashi. Maximal Surfaces in the 3-Dimensional Minkowski Space $\mathbb{L}^3$. Tokyo J. Math. 6, 1983.