Undergraduate

Geometry Seminar

Self-similar solutions of the curvature flow and of the inverse curvature flow on the 2-dimensional light cone

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September 16, 2020

Time: 10:30 am

Acesso à sala virtual:

Abstract. We prove that there exists a relationship between the solutions of the curvature flow and the solutions of the inverse curvature flow. We show that a curve on the light cone is a self-similar solution of the curvature flow if, only if, its curvature differs by constant of the inner product between its tangent vector field and a fixed vector of the 3-dimensional Minkowski space. Similarly, we prove that a curve on the light cone is a self-similar solution of the inverse curvature flow if, only if, the inverse curvature function differs by a constant of the inner product between its tangent vector field and a fixed vector of the 3-dimensional Minkowski space. We use the characterization of the self-similar solutions of the curvature flow to provide a qualitative study. We prove that, for each fixed vector there is a 2-parameters family of self-similar solutions of the curvature flow and of the inverse curvature flow on the light cone. Moreover, we show that at the ends of a self-similar solution of the curvature flow the curvature is unlimited or it converges to a constant.

References

[1] Liu, H. *Curves in the light cone*. Contributions to Algebra and Geometry, v. 45, n. 1, p. 291-303 (2004).

[2] O'Neill, B. *Semi-riemannian geometry with applications to relativity*. Academic Press 103, (1983).