Trivalent maximal surfaces in Minkowski 3-space

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ABSTRACT

In this talk we introduce trivalent maximal surfaces in Minkowski 3-space $\mathbb{R}^{2,1}$ based on the combination of two ideas below. In particular, we see that such trivalent maximal surfaces admit associated families and they also have variational properties and certain singularities. Interesting examples are given by Schramm's orthogonal circle patterns.

Lam [1] investigated two types of trivalent surfaces in Euclidean 3-space $\mathbb{R}^3$ with vanishing mean curvature, which are called trivalent minimal surfaces in $\mathbb{R}^3$. The advantage of this discretization is that we can treat both integrable geometric aspects of such minimal surfaces in $\mathbb{R}^3$ and their variational properties, which generalize many previous works.

On the other hand, Yasumoto [3] described quadrilateral surfaces (or, discrete surfaces) in $\mathbb{R}^{2,1}$ with mean curvature identically 0, which are called discrete maximal surfaces in $\mathbb{R}^{2,1}$. Unlike the case of discrete surfaces in $\mathbb{R}^3$ with vanishing mean curvature, it is shown that discrete maximal surfaces in $\mathbb{R}^{2,1}$ generally have singularities, which occurs only in the case of discrete constant mean curvature surfaces in Lorentzian spaceforms.

This talk is based on joint work with Wai Yeung Lam (TU Berlin) [2].

References

[1] W.Y. Lam, Discrete minimal surfaces: critical points of the area functional from integrable systems, preprint, arXiv:1510.08788v2.

[2] W.Y. Lam and M. Yasumoto, Trivalent maximal surfaces in Minkowski space, in preparation.

[3] M. Yasumoto, Discrete maximal surfaces with singularities in Minkowski space, Differential Geometry and its Applications **43** (2015), 130-154.

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