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Journal of Convex Analysis 18 (2011) 139–152

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A Weighted Steiner Minimal Tree for Convex Quadrilaterals on the Two-Dimensional K-Plane

We provide a method to find a weighted Steiner minimal tree for convex quadrilaterals on a two-dimensional hemisphere of radius $\frac{1}{\sqrt{K}}$, for $K > 0$ and the two dimensional hyperbolic plane of constant Gaussian Curvature K , for $K < 0$ by introducing a method of cyclical differentiation of the objective function with respect to four variable angles. By applying this method, we find a generalized solution to a problem posed by C.F. Gauss in the spirit of weighted Steiner trees.

Keywords: Steiner minimal tree, generalized convex quadrilaterals.

MSC: 51E12, 52A10, 52A55, 51E10