Publications Mathematicae Debrecen | **Year: 2023** | **Vol.: 103** | **Fasc.: 3-4**

Title: A class of critical surfaces in a Finsler space under the volume preserving variation

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Let $(\mathbb{R}^3, \tilde{F}_b)$ be the 3-dimensional Randers space with the metric

$$\tilde{F}_b = \sqrt{(dx^1)^2 + (dx^2)^2 + (dx^3)^2} + bdx^3,$$

where $0 \leq b < 1$ is a constant. In this paper, we study the critical surfaces under the volume preserving variation in $(\mathbb{R}^3, \tilde{F}_b)$ under the Busemann–Hausdorff measure. We introduce a quantity $H_\sigma = \text{const.}$ to characterize such surfaces which are called the constant mean curvature surfaces. Similar to Delaunay's famous work [10], we give a complete classification of CMC surfaces rotating around the x^3-axis in the 3-dimensional Randers space with the Busemann–Hausdorff measure, which reduces to the classical classification of Delaunay's CMC surfaces in $\mathbb{R}^3$ when $b = 0$. The method developed in this paper may be applied to find the CMC surfaces under the Holmes–Thompson measure in the (α, β)-spaces.

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