On the isoptic hypersurfaces in the n-dimensional Euclidean space

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Abstract

The theory of the isoptic curves is widely studied in the Euclidean plane $\mathbf{E}^2$. The analogous question was investigated by the authors in the hyperbolic $\mathbf{H}^2$ and elliptic $\mathcal{E}^2$ planes (see [1], [2]), but in the higher dimensional spaces there is no result according to this topic.

In this lecture we give a natural extension of the notion of the isoptic curves to the n-dimensional Euclidean space $\mathbf{E}^n$ $(n \geq 3)$ which are called isoptic hypersurfaces. We develope an algorithm to determine the isoptic hypersurface $\mathcal{H}_\mathcal{D}$ of an arbitrary $(n-1)$ dimensional compact parametric domain $\mathcal{D}$ lying in a hyperplane in the Euclidean n-space. We will determine the equation of the isoptic hypersurfaces of rectangles $\mathcal{D} \subset \mathbf{E}^2$ and visualize them with Wolfram Mathematica. Moreover, we will show some possible applications of the isoptic hypersurfaces.

Keywords: isoptic curves, differential geometry, hypersurfaces

References

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