
REMARKS ON A GENERALIZED JOUKOWSKI TRANSFORMATION

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ABSTRACT

The classical complex Joukowski transformation is a conformal mapping that maps a disk onto an airfoil denoted as Joukowski airfoils. Its properties and role in physical applications have motivated the study of its generalization. However, extending the Joukowski function to higher-dimensional contexts has reveal some intrinsic difficulty, for example, the fact that in higher-dimensional singularities, folds, or self-intersections can be created. In [2], a higher-dimensional analogue of the Joukowski transformation is described using hypercomplex Appell polynomials introduced in [4], and the different geometric configurations of the image of spheres were studied for the tree-dimensional case. The main topic of [1] also focused on three-dimensional generalized Joukowski transformation of order two, and their geometric deformations were thoroughly explored through visualizations. In [3], was shown that, for certain radii, the three-dimensional generalized Joukowski transformation presented in [2] is 4-quasiconformal.

In this work we intend to revisit the generalized Joukowski-type transformation and study some of its properties.

Keywords Hypercomplex differentiable functions · Generalized Joukowski transformation · Quasiconformal mappings

References

- [1] Cruz, C., Falcão, M.I., Malonek, H.R., 3D Mappings by Generalized Joukowski Transformations. In: Murgante, B., Gervasi, O., Iglesias, A., Taniar, D., Apduhan, B.O. (eds) Computational Science and Its Applications - ICCSA 2011. Lecture Notes in Computer Science, vol 6784. Springer, Berlin, Heidelberg.
- [2] De Almeida R., Malonek H.R., On a Higher Dimensional Analogue of the Joukowski Transformation, AIP Conf. Proc. 1048, 630–633, 2008.
- [3] Malonek H.R., De Almeida, R., A note on a generalized Joukowski transformation. Applied Mathematics Letters 23: 1174–1178, 2010.
- [4] Malonek H.R., Falcão M.I., Special monogenic polynomials properties and applications, in: Conference Proceedings, American Institute of Physics, New York, 936: 764-767, 2007.

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