

GEOMETRIC CHARACTERISTICS OF SIMPLY CONNECTED PLANAR SECTIONS WITH APPLICATION TO AIRFOILS

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Abstract

The presented work is to develop a numerical computation program to determine the geometrical characteristics of arbitrary simply connected planar sections and applications to airfoils. In the literature, there are exact analytical solutions only for some simple geometry such as circular, rectangular and elliptical sections. Hence our interest is focused on the search of approximate numerical solutions for more complex sections used in aeronautics. The used method is to subdivide the section in the infinitesimal triangular section with a single observer within the area having a suitable position. The characteristics of any triangle, given by the positions of these three nodes are known in the literature. Using the principle of compound surfaces, one can determine the geometric characteristics of the airfoil surface. The analytic function of the airfoil boundary is obtained by using the cubic spline interpolation because the airfoil is given in the form of tabulated points. An error estimation is done to determine the accuracy of the numerical computation.

Keywords: *Triangular element, Simply connected domain, Airfoil, Cubic spline interpolation, Geometric features of any triangle, Error calculation*

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