عنوان مقاله:

The Effects of Shape Parameterization on the Efficiency of Evolutionary Design Optimization for Viscous Transonic Airfoils

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خلاصه مقاله:

The effect of airfoil shape parameterization on optimum design and its influence on the convergence of the evolutionary optimization process is presented. Three popular airfoil parametric methods including PARSEC, Sobieczky and B-Spline (Bezier curve) are studied and their efficiency and results are compared with those of a new method. The new method takes into consideration the characteristics of viscous transonic flows particularly around the trailing edge. The methods are applied to airfoil shape optimization at high Reynolds number turbulent flow conditions using Genetic Algorithm. An unstructured grid Navier-Stokes flow solver with a two-equation K-e turbulence model is used to evaluate the objective function. The original mesh movement strategy (Spring analogy) is modified particularly inside the boundary layer in order to maintain the quality of cells in this area. The aerodynamic characteristics of the optimum airfoil obtained from the proposed parametric method are compared with those from alternative methods. It is concluded that the new method is capable of finding efficient and optimum airfoils in fewer number of evaluations.

کلمات کلیدی:

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