

The Influence of Variable Geometrical Modifications of the Trailing Edge of Supercritical Airfoil on the Characteristics of Aerodynamics

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Abstract : The fuel consumption of modern, high wing loading, commercial aircraft in the first stage of flight is high because the usable flight level is lower and the weather conditions (jet stream) have great impact on aircraft performance. To reduce the fuel consumption, it is necessary to raise during first stage of flight the L/D ratio value within Cl 0.55-0.65. Different variable geometrical wing trailing edge modifications of SC(2)-410 airfoil were compared at M 0.78 using the CFD software STAR-CCM+ simulation based Reynolds-averaged Navier-Stokes (RANS) equations. The numerical results obtained show that by increasing the width of the airfoil by 4% and by modifying the trailing edge airfoil, it is possible to decrease airfoil drag at Cl 0.70 for up to 26.6% and at the same time to increase commercial aircraft L/D ratio for up to 5.0%. Fuel consumption can be reduced in proportion to the increase in L/D ratio.

Keywords : L/D ratio, miniflaps, mini-TED, supercritical airfoil

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