Computational investigation of the fuselage shape impact on the pusher thrust

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The reduction of power consumed by engines and the corresponding decrease of fuel flow demand improve the efficiency and environmental performance of air transport. In consequence of the investigations conducted by means of contemporary computational methods and their verification with the experimental data obtained in the wind tunnel, we have discovered that the thrust increment at the baseline configuration does not surpass the incremental drag to the full extent. The analytic investigation of the flow over the fuselage basic model has shown that there has been observed a sizable suction face close to the pusher screw, that is why it is necessary to increase the pressure in the rear part of the fuselage with the purpose of reducing losses from this resistance when increasing the flight speed. Therefore we suggest upgrading the rear part of the fuselage in order to increase the effective propeller thrust, which is defined as being the propeller thrust reduced by the fuselage resistance. For these modifications we have applied a R.H. Libik series of wing profiles based on the theory of B.S. Stratford. These profiles are tolerant to shape defects and environmental change, and their friction is close to zero. Due to upgrading the fuselage rear part shape we have achieved a beneficial effect of interaction with the thrust propeller. The proposed solution compared to the initial geometry provided the reduction of the resistance and the increase both in pressure on the fuselage rear part surface and in the thrust of the propeller.

Keywords: *aerodynamic characteristics, fuselage, increasing the thrust of the propeller, interference, reduction of the resistance*

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