The Influence of Aspect Ratio and Angle of Attack on the Aerodynamic Performance of Airfoils[1]

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Abstract

In this research, the influence of the wing's aspect ratio and the angle of attack on the airfoil performance and efficiency are investigated. The objective of this research is to find the effect of this ratio on the aircraft fuel consumption with different flight speeds.

Three samples of different aspect ratios such as AR=2 ،AR=2.7 and AR=3 of symmetrical airfoils type NACA0012, were tested in this research, with different attack angles from 0 to 20 degrees, at constant wind speed of about 35 m/s.

The tests are performed by the low- speed wind tunnel, its maximum wind speed is about 75 m/s and it is supplied with a closed type test section of 86×86 cm. The results of this research clarify that the Aspect Ratio (AR) has an important effect on the aerodynamic performance of the airfoils. Especially It has a great effect on the drag force of the wing. Finally, the results show that the optimal wing performance was achieved at AR=2.7 with wing efficiency at about 36% and angles of attack ranging from 6^o to 10^o with wind speed of 35m/s.

[1] For the paper in Arabic see pages (129- 136).

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