World Academy of Science, Engineering and Technology
International Journal of Chemical and Materials Engineering
Vol:9, No:01, 2015

Prediction of Flow Around a NACA 0015 Profile

Authors : Boukhadia Karima

Abstract : The fluid mechanics is the study of fluid motion laws and their interaction with solid bodies, this project leads to illustrate this interaction with depth studies and approved by experiments on the wind tunnel TE44, ensuring the efficiency, accuracy and reliability of these tests on a NACA0015 profile. A symmetric NACA0015 was placed in a subsonic wind tunnel, and measurements were made of the pressure on the upper and lower surface of the wing and of the velocity across the vortex trailing downstream from the tip of the wing. The aim of this work is to investigate experimentally the scattered pressure profile in a free airflow and the aerodynamic forces acting on this profile. The addition of around-lateral edge to the wing tip was found to eliminate the secondary vortex near the wing tip, but had little effect on the downstream characteristics of the trailing vortex. The increase in wing lift near the tip because of the presence of the trailing vortex was evident in the surface pressure, but was not captured by circulation-box measurements. The circumferential velocity within the vortex was found to reach free-stream values and produce core rotational speeds. Near the wing, the trailing vortex is asymmetric and contains definite zones where the stream wise velocity both exceeds and falls behind the free-stream value. When referenced to the free stream velocity, the maximum vertical velocity of the vortex is directly dependent on α and is independent of Re. A numerical study was conducted through a CFD code called FLUENT 6.0, and the results are compared with experimental.

Keywords : CFD code, NACA Profile, detachment, angle of incidence, wind tunnel
Conference Title : ICMCE 2015 : International Conference on Materials and Chemical Engineering
Conference Location : Jeddah, Saudi Arabia
Conference Dates : January 26-27, 2015