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CFD Calculations of S809 Aerodynamic Characteristics

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Abstract¹

Steady-state, two-dimensional CFD calculations were made for the S809 laminar-flow, wind-turbine airfoil using the commercial code CFD-ACE. Comparisons of the computed pressure and aerodynamic coefficients were made with wind tunnel data from the Delft University 1.8m x 1.25m low-turbulence wind tunnel. This work highlights two areas in CFD that require further investigation and development in order to enable accurate numerical simulations of flow about current generation wind-turbine airfoils: transition prediction and turbulence modeling. The results show that the laminar-to-turbulent transition point must be modeled correctly to get accurate simulations for attached flow. Calculations also show that the standard turbulence model used in most commercial CFD codes, the k-e model, is not appropriate at angles of attack with flow separation.

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