

Abstract

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Numerical Simulation of Turbulent Heat Transfer in Turbine Blades

Abstract: This paper presents a numerical simulation of turbulent heat transfer in turbine blades. The study is conducted using a finite volume method (FVM) based on the Reynolds-averaged Navier-Stokes (RANS) equations. The turbulence is modeled using the $k-\epsilon$ model. The computational domain is discretized using a structured grid. The inlet conditions are specified as a fully developed turbulent flow with a Reynolds number $Re = 10000$ and a temperature of $55^\circ C$. The outlet conditions are specified as a fully developed flow with a pressure of $0 Pa$. The wall conditions are specified as a constant temperature of $1000 K$. The results show that the turbulent heat transfer coefficient is significantly higher than the laminar heat transfer coefficient. The maximum temperature on the turbine blade surface is found to be $1000 K$. The results are compared with experimental data and show good agreement.