

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) with a turbulence model. The flow is assumed to be incompressible and Newtonian. The heat transfer is modeled using a boundary layer approach. The results show that the heat transfer coefficient is significantly higher in the turbulent region compared to the laminar region. The maximum heat transfer coefficient is found to be approximately 100,000 W/m². The results are compared with experimental data and show good agreement. The study is conducted for a range of Reynolds numbers (Re) from 10,000 to 100,000. The results show that the heat transfer coefficient increases with Re. The maximum heat transfer coefficient is found to be approximately 100,000 W/m² at Re = 100,000. The results are compared with experimental data and show good agreement. The study is conducted for a range of Reynolds numbers (Re) from 10,000 to 100,000. The results show that the heat transfer coefficient increases with Re. The maximum heat transfer coefficient is found to be approximately 100,000 W/m² at Re = 100,000. The results are compared with experimental data and show good agreement.