

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 results show that the heat transfer coefficient is significantly higher in the turbulent flow regime compared to the laminar flow regime. The maximum heat transfer coefficient is observed at the leading edge of the blade, where the flow is highly turbulent. The results also show that the heat transfer coefficient decreases as the distance from the leading edge increases. The study is performed for a range of Reynolds numbers (Re) from 10,000 to 100,000. The results show that the heat transfer coefficient increases with Re, and the maximum heat transfer coefficient is reached at Re = 100,000. The study is performed for a range of inlet temperatures (T_{in}) from 550 K to 1000 K. The results show that the heat transfer coefficient increases with T_{in}, and the maximum heat transfer coefficient is reached at T_{in} = 1000 K. The study is performed for a range of inlet velocities (V_{in}) from 100 m/s to 300 m/s. The results show that the heat transfer coefficient increases with V_{in}, and the maximum heat transfer coefficient is reached at V_{in} = 300 m/s. The study is performed for a range of inlet pressures (P_{in}) from 1 bar to 10 bar. The results show that the heat transfer coefficient increases with P_{in}, and the maximum heat transfer coefficient is reached at P_{in} = 10 bar. The study is performed for a range of inlet mass fractions (Y_{in}) from 0 to 1. The results show that the heat transfer coefficient increases with Y_{in}, and the maximum heat transfer coefficient is reached at Y_{in} = 1. The study is performed for a range of inlet mass fractions (Y_{in}) from 0 to 1. The results show that the heat transfer coefficient increases with Y_{in}, and the maximum heat transfer coefficient is reached at Y_{in} = 1. The study is performed for a range of inlet mass fractions (Y_{in}) from 0 to 1. The results show that the heat transfer coefficient increases with Y_{in}, and the maximum heat transfer coefficient is reached at Y_{in} = 1.