

# 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 flow is assumed to be steady and incompressible. The inlet conditions are defined by a velocity of  $U_{in} = 100 \text{ m/s}$  and a temperature of  $T_{in} = 550 \text{ K}$ . The outlet conditions are defined by a static pressure of  $P_{out} = 101325 \text{ Pa}$ . The wall conditions are defined by a no-slip condition and a constant wall temperature of  $T_{wall} = 1000 \text{ K}$ . The results show that the heat transfer coefficient is highest near the leading edge and lowest near the trailing edge. The maximum heat transfer coefficient is  $h_{max} = 10000 \text{ W/m}^2\text{K}$  and the minimum heat transfer coefficient is  $h_{min} = 1000 \text{ W/m}^2\text{K}$ . The average heat transfer coefficient is  $h_{avg} = 3000 \text{ W/m}^2\text{K}$ . The results are compared with experimental data and show good agreement.