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Analysis of the effect of holes on the heat transfer analysis of gas turbine blade cooling using CFD

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Abstract: Gas turbines are largely used for aircraft propulsion, power generation, oil and gas and various other industrial applications. They are operated at very high temperatures, where hot gas from the combustion chamber flows past the turbine blades. This may cause severe damage to the components of the gas turbine engine, and it reduces the lifespan of the turbine blade. Therefore, it is very important to cool the turbine blade for the safe operation of the gas turbine engine and to improve the performance. Many methods have been proposed for cooling of blades and one approach is to pass cooling air through radial holes with high velocity along the blade span. In this present work, Computational Fluid Dynamics (CFD) simulations are used to investigate the heat transfer analysis of a gas turbine with models consisting of several inline holes and to compare it to models without holes. The simulations were performed with standard k-e turbulence models. From the results of pressure, velocity and temperature distribution contour plots, the correlation of the heat transfer increase for the models to the number of holes is studied.

Key Words: *Gas Turbine, Turbine blade cooling, Computational Fluid Dynamics (CFD), Heat Transfer analysis*

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