

عنوان مقاله:

Film cooling simulation on an entire gas turbine blade with square pulsed coolant injection

محل انتشار:

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خلاصه مقاله:

Film cooling is an effective method to keep the gas turbine blades from high temperature gases and thermal stresses. Square pulsating film cooling on different sections of a modified NASA C₃X blade is numerically investigated. Temperature distribution and film cooling performance are investigated for various blowing ratios of 0.5, 0.75, 1.0, 1.5, 2 and 2.5 in pulse frequency of 50 Hz. Reynolds-Averaged Navier-Stokes equations for steady and pulsating injection considered. The shear stress transport () model applied for turbulence effects. Simulations are performed using finite volume method. Obtained results show different findings of pulsating film cooling on the various blade surfaces. For large blowing ratios, averaged pulsed film covering effectiveness at leading edge and pressure side of blade is reduced compared to small and middle values of blowing ratios. This trend is reversed in the suction side. Reynolds number of mainstream has the maximum effect on film effectiveness distribution on pressure section. The averaged centerline pulsed film coolant performance on the pressure surface and leading edge at blowing ratio of 0.5 and for suction side at blowing ratio 2.5 was maximum.

کلمات کلیدی:

numerical simulation, blade, Film cooling, Square Pulsation, Effectiveness

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