Postprint: Film Cooling Characteristics of Endwall Leakage Flow from Trailing Sections of Inter-Blade Assembly Gaps

Authors: Li Yifei, Zhang Yang, Yuan Xin

Date: 2017-10-30T00:00:00+00:00

Abstract

To reveal the influence mechanism of endwall assembly gap geometric parameters on the film cooling characteristics downstream of the blade trailing edge, a numerical simulation study was conducted on the assembly gap film cooling characteristics in a GE-E3 linear cascade. The findings indicate that slot geometric parameters significantly affect the cooling characteristics of the blade trailing edge. Among the endwalls on both sides of the assembly gap, elevating the endwall near the suction surface relative to the opposite side proves advantageous for enhancing endwall film effectiveness. While the double-sided chamfer structure improves film effectiveness in regions adjacent to the assembly gap, it concurrently enlarges the cooling blind zone. The assembly gap structure should be designed and optimized with the objectives of establishing a geometric configuration with a higher suction side and increasing the cooling outflow velocity.

Full Text

Journal of Engineering Thermophysics, August 2017

Authors: LI Yi-Fei, ZHANG Yang, YUAN Xin
Affiliation: Key Laboratory for Thermal Science and Power Engineering of Ministry of Education, Tsinghua University, Beijing 100084, China

Abstract

To investigate the film cooling effect of leakage from the midpassage gap on the downstream endwall, the influence of gap geometry is numerically examined in the guide vane of a GE-E3 turbine. Regarding the step height of the gap, when the wall near the suction side of the blade is lower (SSL) than the opposite wall

near the pressure side of the neighboring blade, the leakage exhibits a positive effect on film cooling. Conversely, the effect is negative for the opposite step configuration. Additionally, while cutting corners on both sides of the gap wall enhances cooling effectiveness, it also increases the cooling blind area.

Keywords: midpassage gap; step direction; cut corner

Note: Figure translations are in progress. See original paper for figures.