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Numerical Simulation of Effect of Various Rib Configurations on Enhancing Heat Transfer of Matrix Cooling Channel

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Abstract : The matrix cooling channel was used for gas turbine blade cooling passage. The matrix cooling structure is useful for the structure stability however the cooling performance of internal cooling channel was not enough for cooling. Therefore, we designed the rib configurations in the matrix cooling channel to enhance the cooling performance. The numerical simulation was conducted to analyze cooling performance of rib configured matrix cooling channel. Three different rib configurations were used which are vertical rib, angled rib and c-type rib. Three configurations were adopted in two positions of matrix cooling channel which is one fourth and three fourth of channel. The result shows that downstream rib has much higher cooling performance than upstream rib. Furthermore, the angled rib in the channel has much higher cooling performance than vertical rib. This is because; the angled rib improves the swirl effect of matrix cooling channel more effectively. The friction factor was increased with the installation of rib. However, the thermal performance was increased with the installation of rib in the matrix cooling channel.

Keywords : matrix cooling, rib, heat transfer, gas turbine
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