半圓柱凹面覆蓋多孔材之衝擊熱傳數值探討

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摘 要

衝擊熱傳在工業界中運用廣泛，如：雷射冷卻、電子散熱、金屬與玻璃退火與氣渦輪機葉片冷卻等。衝擊冷卻技術也曾被嚐試與其他技術作結合。本研究的主要目的乃是結合衝擊冷卻與多孔材之應用以增強熱傳，並著重在氣輪機葉片前端散熱之可能應用。 本研究以數值模擬方法探討一圓型噴束衝擊有、無覆蓋多孔材之半圓柱凹面的熱傳問題。當凹面有覆蓋多孔材時，其中心都有一噴束集流孔。改變的參數包含有雷諾數、噴嘴到目標板距離、相對曲率。計算結果顯示，雷諾數越高，其熱傳效果越好。噴嘴出口到凹面的距離愈短時，停滯區的紐賽數愈高；而該距離愈大時，遠離停滯區的紐賽數變得更好，此現象當雷諾數愈高時愈明顯。由相對曲率的探討結果顯示，選擇噴嘴直徑大於集流孔之直徑，其熱傳效果較好，使用小於集流孔直徑的噴嘴將導致紐賽數明顯的下降。

關鍵詞 : 半圓柱凹面、衝擊熱傳、集流孔、多孔材、數值模擬

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