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折线斜缝式机匣处理对轴流压气机端部流场影响的实验研究及分析

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INVESTIGATION OF COMPRESSOR ENDWALL AND SLOTTED CASING TREATMENT FLOW PHENOMENA

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摘要

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摘要 在一个单级轴流压气机的孤立转子上, 通过实验的方法详细研究了折线斜缝式处理机匣对压气机总性能及基元性能的影响。在总体效果最佳的轴向叠合量下, 研究了机匣处理前后转子进出口轴向速度的变化、基元总压比的变化及载荷系数的变化。该种新型的处理机匣形式不仅扩大了压气机的稳定工作范围, 而且使压气机的峰值效率及边界点效率有所提高。利用三维热线风速仪结合锁相集平均技术测量了实壁机匣及处理机匣转子后的三维流场, 得出了动叶端部二次流流场的详细结构及相对动能分布图。

关键词: 折线斜缝式处理机匣 端部流动 转子裕度

Abstract: The sloped slotted compressor casing treatment is designed and researched with the help of an isolated rotor. The efficiency and stall margin have been effectively increased by the new kind of casing treatment. Various characteristics of this treatment have been evaluated. The general flow structure around the rotor has been shown. The three dimension flow field in the endwall region has been carried out through hot wire anemometer and phase locked average technology. The results show clear evidence of a leakage vortex core behind the rotor. The stall margin improvement is produced by both flow suction and injection from the treatment region. Because the broken line angle of slotted treatment casing may affect the injecting flow direction, it also affects the stall margin improvement.

Keywords: slotted casing treatment endwall flow stall margin

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