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综述评论

透平机械叶尖间隙流场研究的进展

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摘要 叶尖间隙流动对透平机械性能有很大影响。长期以来，叶尖间隙流动机理一直是透平机械领域研究的一个热点，同时也是一个尚未认识清楚的难点。把叶尖间隙内流动的研究进展分成两个部分：一部分是透平叶栅和透平转子内部叶尖间隙流场的研究进展，另一部分是压气机叶栅和压气机转子内部叶尖间隙流场的研究进展。对目前叶尖间隙研究集中的问题，如泄漏涡系结构，泄漏流动模型，泄漏涡旋涡强度的变化，泄漏涡和激波的相互作用等进行了简要的总结。文中还对透平机械叶尖间隙泄漏流动常用的数值计算方法进行了总结。认为今后应进一步对以下问题进行研究，其中包括研究高速透平机械叶尖泄漏涡旋涡强度变化问题，径流式叶轮机械叶尖间隙泄漏流动过程及泄漏涡发生发展规律问题，泄漏涡与激波相互作用产生阻塞区域的大小问题。

关键词 透平机械 叶尖 泄漏流动 泄漏涡

分类号

A REVIEW OF STUDIES ON TURBOMACHINERY TIP GAP LEAKAGE FLOW

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Abstract

The objective of this paper is to review and assess various models, experiment techniques and numerical methods for the analysis of the fluid mechanism about the tip gap leakage flow within turbomachines. The origins and effects of tip gap leakage flow on the performance of turbomachines are discussed with the emphasis on the physical origins of tip gap leakage flow. Blades are concerned with two types of flows, that is diffusing, or compressor type flows and accelerating, or turbine type flows. A brief review on the tip gap leakage flow of the blades is made as a main content of the paper. It can be found from the review that the major issues at present about the tip leakage flow of turbomachinery are focused on the leakage vortex structure, the leakage flow model, the vorticity, and the shock-leakage vortex interaction, etc. Meanwhile, recommendations are made for future research, including the vorticity in high-speed turbine and compressor, the tip leakage vortex breakdown, the relationship between stall and leakage flow, and the size of blockage region.

Key words turbomachinery blade tip leakage flow leakage vortex

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