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论文

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### 低速轴流压气机中前后静叶对动叶顶部区域流动的影响

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### Effects of Upstream and Downstream Stators on Rotor Tip Flow in a Low-speed Axial Compressor

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摘要

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**摘要** 数值研究了某二级低速轴流压气机在高负荷工况下,动叶前后动静干涉对动叶顶部区域非定常流动的影响。结果显示一次泄漏涡和二次泄漏涡是动叶顶部的主要流动特征。下游静叶干涉增加了动叶顶部间隙流的非定常波动强度和泄漏损失。上游静叶干涉减少了动叶顶部二次泄漏流强度。同无动静干涉相比,同时存在上下游动静干涉使动叶顶部区域总压损失减少9.1%,其收益主要来自上游静叶的非定常干涉。

**关键词:** 非定常流动 顶部泄漏涡 动静干涉 压气机

**Abstract:** Effects of upstream and downstream stators on the unsteady flow in the rotor tip region in a low-speed two-stage axial compressor under high loading operating condition are investigated by numerical method. The result shows that double leakage vortices are the dominating flow behaviors in the rotor tip region. Downstream rotor-stator interaction increases the unsteady fluctuating intensities of the rotor tip clearance flow and the tip leakage loss. Upstream stator-rotor interaction reduces the double leakage flow intensity in the rotor tip region. Comparing with that of no upstream and downstream stator interactions, the total pressure loss has a 9.1% decrease in the rotor tip region with concurrent upstream and downstream stator interactions. The improvement of the rotor tip performance mainly comes from the upstream unsteady stator-rotor interaction.

**Keywords:** unsteady flow tip leakage vortex rotor-stator interaction compressor

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