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吸附式低反动度轴流压气机气动设计原理

Aerodynamic design principle of aspirated and low-reaction axial-compressors

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中文关键词： 低反动度 轴流压气机 亚声速 超、跨声速 高负荷设计 附面层抽吸

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作者	单位
王松涛	哈尔滨工业大学 能源科学与工程学院，哈尔滨 150001
胡应交	哈尔滨工业大学 能源科学与工程学院，哈尔滨 150001
王仲奇	哈尔滨工业大学 能源科学与工程学院，哈尔滨 150001

中文摘要:

针对亚声速及超、跨声速轴流压气机，全面论述了吸附式低反动度轴流压气机气动设计思想，指出了该思想的具体实现形式、应用条件以及各参数之间的相互影响.指出针对亚声速轴流压气机，可利用动叶出口轴向速度提升或增加动叶入口正预旋以降低动叶中扩压因子从而确保动叶流动效率；而针对超、跨声速轴流压气机，可通过提升动叶入口激波后的轴向速度实现气流在动叶中大幅折转并保证动叶效率.其出口轴向速度选取，需兼顾动叶效率以及下游静叶栅入口马赫数以及气流角需求.最后总结了吸附式低反动度轴流压气机的研究进展.

英文摘要:

For subsonic,supersonic and transonic axial-compressors,comprehensive explanation was made for the low reaction aerodynamic design principle of the aspirated compressor stages.The specific implementation form of this principle was put forward,while the application conditions and mutual interactions between aerodynamic parameters,such as twist speed and axial velocity,were analyzed.For subsonic axial-compressors,the diffusion factor could be reduced by increasing the rotor exit axial velocity or by enlarging the positive pre-swirl of the rotor entrance flow.For transonic or supersonic axial-compressors,the flow in the rotor could attain large turning efficiently by increasing the axial velocity after the entrance shock.The specific value of the outlet axial velocity could be chosen depending on the rotor efficiency and the requirements of the entrance Mach number and absolute flow angle of the downstream stator.At last,the progresses made on this design principle were summarized.

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