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## 压气机S形转接段半反问题设计方法研究

### Half-inverse problem for design of S-shaped compressor transition duct

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中文关键词: [压气机](#) [S形转接段](#) [反问题](#) [静压梯度](#) [遗传算法](#)

英文关键词: [compressor](#) [S-shaped transition duct](#) [inverse problem](#) [static pressure gradient](#) [genetic algorithm](#)

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中文摘要:

研究了压气机部件间S形转接段的气动设计方法, 提出了一种控制转接段壁面静压梯度等参数的半反问题设计, 并发展了相应设计程序. 采用所述方法, 对某轴流-离心压气机转接段进行了设计验证. 结果表明: 通过调整反问题设计参数, 可以自由控制内壁面的静压分布及壁面几何, 又通过对外壁面几何进行数值匹配, 能够很好地实现所设计的内壁面上的静压分布, 验证了本方法可行. 在未寻求最优内壁面静压梯度分布的情况下, 进口高度长度比达0.138, 轮毂半径差长度比达0.485的轴对称转接段的总压恢复系数可达0.98以上.

英文摘要:

An aerodynamic design method of S-shaped transition duct between compressor components was studied. Based on the control of wall static pressure gradient of the transition duct, etc, a half-inverse problem design strategy was proposed, and the corresponding design code was developed. To verify the feasibility of the method, a transition duct for axial-centrifugal compressor was designed by the method mentioned above. The result shows that the static pressure distribution on inner wall along with its geometry can be controlled freely by adjusting the inverse design parameters. The designed static pressure distribution on inner wall can be realized through the numerical matching procedure of the outer wall geometry. The design method is practicable since the total pressure recovery coefficient of the axial-symmetric transition duct can be above 0.98 without searching the optimal static pressure gradient distribution on inner wall, when the duct parameters of inlet-height/length ratio is 0.138, and hub-radius-difference/length ratio is 0.485.

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