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## 跨音速压气机转子中三维湍流流场计算及涡系分析

沈孟育, 刘秋生, 郭延虎, 王保国

清华大学工程力学系, 北京, 100084

### COMPUTATIONS AND VORTEX ANALYSIS OF THREE DIMENSIONAL TURBULENT FLOW FIELDS IN A TRANSONIC COMPRESSOR ROTOR

Shen Mengyu, Liu Qiusheng, Guo Yanhu, Wang Baoguo

Department of Engineering Mechanics, Tsinghua University, Beijing, 100084

摘要

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**摘要** 从叶轮机械转动坐标系中的三维、可压、湍流、Reynolds平均N-S方程组出发,用Baldwin-Lomax湍流模式使方程组闭合;结合有限体积离散并采用隐式矢量通量分裂技术;求解了西德宇航院(DFVLR)的单级跨音速压气机转子内的三维湍流流场。计算结果可分辨出该转子内三维流场的细微结构、激波的空间曲面;得到马蹄涡、通道涡、尾迹涡和角涡的形态及其发展,流场的三维性非常明显。计算得到的壁面极限流线图可反映出压气机中分离流动的拓扑结构

**关键词:** 三维流 湍流模型 通量矢量分裂 压气机转子 跨音速流 旋涡

**Abstract:** A Reynolds averaged Navier Stokes equation is solved for three dimensional flowfield inside a transonic compressor rotor, which has been experimentally investigated at the DFVLR. The numerical solution is based on implicit flux vector splitting scheme, and Baldwin Lomax turbulence model is used for the turbulence modeling. Based on the numerical results, the detailed flowfield structures, the secondary flows, and vortex development in the blade passage have been given.

**Keywords:** three dimensional flow turbulent models flux vector splitting compressor rotor transonic flow vortices

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