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涡喷发动机压气机的单元控制体模型

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AN ELEMENTAL CONTROL VOLUME MODEL OF COMPRESSOR IN TURBOJET ENGINE

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摘要

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**摘要** 根据控制体理论,建立了涡喷发动机中压气机的逐级数学模型。采用特征线关系数值求解质量、动量和能量方程。方程中的叶片力和轴功由稳态的级特性提供,并由一阶滞后方程考虑其动态效应。该模型可以模拟进口温度(或压力)瞬变下压气机的逐级响应,寻找首先失速的关键级。数值结果表明,引起失速的进口温升近似地与进口温升率呈线性关系。

**关键词:**

**Abstract:** A stage by stage mathematical model of the compressor in a turbojet engine is developed based on the control volume theory. The characteristic relationship is applied to solve the governing equations of mass, momentum and energy for each control volume. The stage forces and shaft work required to solve equations are derived from a set of steady stage performance. A first order lagging equation is used to account for dynamic effects. This model can simulate the compressor response to inlet temperature transients and find the critical stage. It is shown from the results that the inlet temperature rise just prior to system instability is approximately linear with the inlet temperature ramp rate.

**Keywords:**

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