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基于逐级叠加法的航空发动机起动模型研究

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Research on Startup Model of Aircraft Engine Based on Stage-Stacking Method

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摘要

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摘要 建立起动过程数学模型的主要困难在于缺少发动机低转速部件特性。提出一种逐级叠加与试验数据相结合的方法计算低转速部件特性,并综合考虑了燃烧室效率变化和部件的热惯性对起动过程的影响,成功地把发动机慢车以上的部件法建模应用到发动机起动过程的性能模拟。通过对某型涡轴发动机仿真结果与试验数据的对比表明,这种低转速部件特性的计算方法具有一定的精度,建立的起动模型可满足研究起动供油规律及估算起动性能的需要。

关键词: 航空发动机 起动过程 逐级叠加法 数学模型 试验数据

Abstract: The main difficult in startup procedure modeling is the lack of component characteristics at low speed. A method combining a stage-stacking method and testing data is developed to calculate the low-speed characteristics. The efficiency variation of combustion and heat conservation between gas and metal are considered for startup procedure. Modeling method which is adopted for normal speed above ideling is successfully applied to startup model. The comparison between simulation and testing data for a turbo-shaft engine indicates that this state-stacking method has reasonable precision in the evaluation of component characteristics, and the startup model developed can be used to study the fuel flow schedule and estimate the starting characteristics.

Keywords: aero engine startup process stage-stacking method mathematical model testing data

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