

Hide Expanded Menus

孙恒超, 陈国定, 陈薄. 泛结构条件下轴承腔油气两相流动的模化方法[J]. 航空动力学报, 2014, 29(8): 1987~1995

泛结构条件下轴承腔油气两相流动的模化方法

Modeling method of bearing chamber oil/air two-phase flow under multi-geometrical conditions

投稿时间: 2013-05-07

DOI: 10.13224/j.cnki.jasp.2014.08.029

中文关键词: [模化](#) [航空发动机](#) [轴承腔](#) [两相流](#) [相似准则](#) [方程分析法](#) [流场](#)

英文关键词: [modeling](#) [aero-engine](#) [bearing chamber](#) [two-phase flow](#) [similarity criterion](#) [equation-based analysis method](#) [flow fields](#)

基金项目: 国家自然科学基金(50975233, 51275411); 西北工业大学研究生创业种子基金(Z2012051)

作者	单位
孙恒超	西北工业大学 机电学院, 西安 710072
陈国定	西北工业大学 机电学院, 西安 710072
陈薄	西北工业大学 机电学院, 西安 710072

摘要点击次数: 112

全文下载次数: 105

中文摘要:

首先根据热力学、流体力学的基本定理对航空发动机轴承腔油气两相流动的相似性进行了数学推导, 获得了弗劳德数、欧拉数、雷诺数、普朗特数和埃克特数等相似准则数. 遵循系统几何相似和动力相似等相似准则建立了航空发动机泛结构及工况条件下轴承腔油气两相流动的模化模型; 并对实际轴承腔及模化轴承腔的油气两相流场进行了数值求解, 模化轴承腔与实际轴承腔无量纲速度、温度和压力分布一致性较好, 支持了提出的轴承腔油气两相流动相似准则和模化方法的可靠性. 泛结构条件下轴承腔油气两相流动模化方法对于指导轴承腔油气两相流动试验设计及推进理论分析向航空发动机工程设计转化都有一定的参考价值.

英文摘要:

The similarity of oil/air two-phase flow in aero-engine bearing chambers was derived according to the basic theorems of thermodynamic and fluid dynamic firstly, the similarity criterion numbers such as Froude number, Euler number, Reynolds number, Prandtl number and Eckert number were obtained, then the model of aero-engine bearing chamber oil/air two-phase flow was built under multi-geometrical and operating conditions following the principle of system similarity. The oil/air two-phase flow fields of prototype and modeling bearing chambers were solved by numerical simulation, and the better consistency of flow fields dimensionless physical characteristic parameters, such as dimensionless tangential velocity, temperature and pressure between prototype and modeling bearing chambers, illustrates that the similarity criterion numbers and modeling method of aero-engine bearing chamber oil/air two-phase flow proposed are reliable. The proposal modeling method has certain reference value for guiding experiment design of bearing chamber oil/air two-phase flow as well as promoting the shift of theory investigation to engineering application of aeroengine lubrication system design.

[查看全文](#) [查看/发表评论](#) [下载PDF阅读器](#)

关闭