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航空发动机转子-支承系统的瞬态响应

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TRANSIENT RESPONSE OF THE ROTOR-SUPPORT SYSTEM OF AEROENGINES

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摘要 本文发展了传递矩阵-直接积分法,把支反力、挤压油膜力及各个轮盘的不平衡力分组单独处理,从而可以在特征盘固定的情况下,综合或分别地研究各个盘不平衡的响应、转子与静子的振动匹配、修改结构及作灵敏度分析;可用于分析转子、支承非对称刚性的系统。为了求转子系统的瞬态响应,还分析、导出了瞬态挤压油膜力,盘、质点在瞬态响应中的传递矩阵等的表达式。本文还附有一双转子支承系统的算例。

关键词: 瞬态响应 转子动力学 传递矩阵-直接积分法 旋转机械

Abstract： This paper developes the transfer matrix-direct integration method. In this research the support reactions, squeeze film forces and unbalance forces are separated into different vectors. Therefore, it is easy to analyze the response from unbalance of any disk or some disks by the governing equations derived for a definite characteristic disk. It can be used to analyze the vibration matching fo the rotor and stator, to modify the structure and make sensitivity analysis.This method is also applicable to the analysis of the rotor-support system with unsymmetric stiffness.To solve the transient response of the system, expressions of the transient squeeze film force and expressions of the transfer matrix of a disk in transient response are derived. An numerical example of a double-spool-support system is given in this paper.

Keywords： transient response rotor dynamics transfer matrix-direct integration method rotating machinery

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