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箔片摩擦效应对转子-箔片轴承系统动力学特性影响试验

Experimental of foil friction effects on dynamics characteristicof rotor-foil bearing system

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中文关键词: 波箔型径向气体箔片轴承 表面粗糙度 振动幅值 轴心轨迹 稳定性

英文关键词: bump-type gas foil journal bearing surface roughness vibration amplitude axis orbits stability

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中文摘要:

为了研究波纹箔片和轴承壳之间的摩擦特性对转子-箔片轴承系统动力学特性的影响,设计了波箔型径向气体箔片轴承-转子试验台,通过在该试验台上对以两组不同轴承壳圆柱孔内表面粗糙度的箔片轴承支承的质量为0.458kg的转子进行转速为0~8000r/min的运行试验,对比分析了波纹箔片与轴承壳内壁之间的摩擦效应对系统转子动力学特性的影响.结果表明:直径为19.98mm的波箔型径向气体箔片轴承能够实现转子高速运行,在转子起飞后具有良好的运行稳定性,其轴承支承处的振动幅值一直维持在20μm附近,并且降低轴承壳内表面粗糙度(摩擦因数)能够让波纹箔片相对容易地在平箔片和轴承壳之间周向滑移,使其吸收并消除转子高频振动,提高转子系统运行稳定性.

英文摘要:

In order to study the effects of foil friction between bump foil and bearing housing on dynamics characterict of rotor-foil bearing system, a test rig was developed for bump-type gas foil bearing. By experiment comparing between two sets of bearing supporting a 0.458kg rotor which have different surface roughness of bearing housing cylindrical hole with speed from 0-80000r/min, the effects of friction between bump foil and bearing housing on rotor dynamics charecteristic are studied. The results indicate that bump-type gas foil journal bearing with 19.98mm diameter can support the rotor's stable running at a quite high speed, and the vibration amplitude at bearing support is around 20μm. Reducing the surface roughness (friction coefficient) of bearing housing cylindrical hole enables relatively easy slippage of bump foil between the top foil and bearing housing, helping to absorb and eliminate high frequency vibration of rotor, and improve the stability of rotor system.

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