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论文

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基础横向振动对电磁轴承转子系统动力特性影响的实验研究

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Experimental Investigation on Dynamic Behaviour of Active Magnetic Bearing-Rotor System Subject to Base Vibration

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摘要

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摘要 从实验上研究了电磁轴承基础的横向振动对电磁轴承转子系统动力特性的影响。结果表明电磁轴承的控制器对电磁轴承基础横向振动的抑制能力是非常有限的,在控制器的设计过程中必须考虑基础振动的影响,否则较大的基础振动会使电磁轴承系统不能稳定地工作,甚至失去支撑转子的能力。

关键词: 电磁轴承 基础振动 转子动力学 振动 转子 控制器

Abstract: When an active magnetic bearing (AMB) is used in advanced jet aero-engines, the base of the AMB system in flight will vibrate at the same frequency as the wing of the airplane and endure an impact load in landing. In these cases, the base vibration and the impact load not only have a great effect on the dynamic behaviour of a rotor system supported on AMBs, but also possibly make the rotating shaft contact with the back-up bearing of the AMB system or make the AMB system fail. The effect of the sinusoidal base vibration at different exciting frequencies and amplitudes on the dynamic behaviour of a rotor system supported on the AMB is experimentally studied in this paper. It is shown that the capability of the AMB's controller for suppressing the base vibration is very limited and that the effect of the base vibration on the dynamic behaviour of the AMB-rotor system must be considered in designing the AMB's controller, otherwise, the AMB will lose its support capability. The higher the amplitude of the base vibration, the greater the effect of the base vibration on the AMB and the higher the possibility of the AMB system failure.

Keywords: active magnetic bearing base vibration rotor-dynamics vibration rotor controller

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