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双盘三支撑转子轴承系统松动-碰摩耦合故障分析

Looseness-rubbing coupling fault of dual-disk three-support rotor-bearing system

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中文摘要:

针对由于支座松动而引起松动-碰摩耦合故障的转子-轴承系统,建立了双盘三支撑的松动-碰摩耦合故障转子系统力学模型和有限元模型.基于非线性有限元方法,使用松动端等效刚度模型及接触理论研究了碰摩刚度和松动刚度两个重要参数对系统动力学特性的影响.通过对在不同碰摩刚度及不同松动刚度条件下的系统动力学特性的研究,发现松动-碰摩耦合故障常常以碰摩故障特征为主,并且时域波形高矮峰交替出现,轴心轨迹呈现“梯形”,这一特性可以作为诊断松动-碰摩耦合故障的一个依据.

英文摘要:

For looseness-rubbing coupling fault of rotor-bearing system caused by pedestal looseness, the mechanical model and finite element model of dual-disk three-support looseness-rubbing coupling fault of rotor-bearing system were established. The research of effect of rubbing stiffness and looseness stiffness on dynamics characteristics of the system was done with equivalent stiffness model on the loose support, nonlinear finite element method and contact theory. Through the relevant research and analysis, it is found that looseness-rubbing coupling fault mainly is embodied in the rubbing fault. It is also found that high and low peaks appeared alternately in the time-domain graph and the shape of the axis orbit is trapezoid. This feature can be a basis which can diagnose looseness-rubbing coupling fault.

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