

双跨转子—轴承系统松动—碰摩耦合故障的非线性特性

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关键词: 故障诊断 转子—轴承系统 松动 碰摩 非线性特性

摘要: 建立了带有基础松动—碰摩耦合故障的具有三轴承支承的双跨弹性转子系统的动力学模型,并对系统非线性动力学特性进行了数值仿真研究。耦合故障转子系统周期运动失稳转速介于松动和碰摩单一故障之间;随着轴承松动支座质量的增加,当转子低频运转时,系统响应的混沌运动区间先增大,以后逐渐减小;在高转速区域(超临界转速区),拟周期运动消失,混沌运动区域逐渐减小,周期分频运动区域增加,且会出现明显的周期3运动区间。A non-linear dynamic model of a two-span elastic rotor-bearing system with coupling faults of pedestal looseness and rub-impact supported on three plain journal bearings was established. The complex motion characteristics of the rotor bearing system were studied numerically. The simulation results show that the unstable rotate speed of the rotor system with coupling faults is between the single fault of pedestal looseness and rub-impact. Within the sub-critical speed range, the chaotic region is increased firstly and then reduced gradually with the increase of the looseness mass. Within the super-critical speed range, the quasi-periodic motion disappears and the chaotic region is reduced gradually with the increase of the looseness mass, and the period-3 motion region appears obviously.

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