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基于乏信息理论的转盘轴承启动摩擦力矩变异分析

Variation analysis of starting friction torque for slewing bearing based on poor information theory

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中文关键词: [轴承](#), [摩擦](#), [力矩](#), [转盘轴承](#), [启动摩擦力矩](#), [变异系数](#), [非线性](#), [不确定性](#)

英文关键词: [bearings](#) [friction](#) [torque](#) [slewing bearing](#) [starting friction torque](#) [variation coefficient](#) [nonlinearity](#) [uncertainty](#)

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中文摘要:

基于乏信息理论探讨转盘轴承启动摩擦力矩和载荷之间的关系, 以揭示启动摩擦力矩估计真值、波动范围、信息熵、变异系数和概率密度函数的非线性演变特征。在模拟试验中, 采用了2种不同的转盘轴承, 对每种轴承改变载荷5次, 同时测量内圈表面上均布6个点的启动摩擦力矩, 并对试验数据进行变异分析。试验结果表明, 随着载荷的增加, 估计真值非线性增大, 变异系数整体上呈现非线性衰减趋势; 在变异系数的非线性衰减过程中有一个敏感点, 在该点处变异系数异常增大。转盘轴承启动摩擦力矩具有变量不确定性和函数多变性。敏感点的发现可以为轴承的性能改进与测量系统分析提供参考。

英文摘要:

Based on the information poor theory, the relationship between the starting friction torque of the slewing bearing and the load was discussed to reveal nonlinear evolution characteristics of the estimated true value, fluctuation range, information entropy, variation coefficient, and probability density function of the starting friction torque. In the simulated experiment, two different slewing bearings were adopted, the load was changed five times for each bearing, the starting friction torques of six points which were evenly distribution on the surface of the inner ring were measured simultaneously, and variation analysis of the test data was made. The test result showed that with the rise of the load, the estimated true value nonlinearly increased and the variation coefficient nonlinearly decreased in view of the overall situations, at which there was a sensitive spot where the variation coefficient increased abnormally. This indicated that the starting friction torque of the slewing bearing had the uncertainty of the variable and the polytropy of the function. The findings provide a reference for analyzing the measuring system and improving the bearing performance.

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