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## 高速圆柱滚子轴承保持架动力学特性分析

## Analysis on dynamic characteristics of cage in high-speed cylindrical roller bearing

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中文摘要:

建立了高速圆柱滚子轴承动力学微分方程, 采用精细积分法和预估-校正Adams-Bashforth-Moulton多步法相结合的算法, 对高速圆柱滚子轴承动力学微分方程进行求解, 并对保持架的动力学特性进行了理论分析. 结果表明: 过大的保持架间隙比不利于保持架稳定运转; 在一个套圈固定、另一个套圈工作状态下, 保持架引导方式采用旋转套圈引导时, 保持架打滑率较低; 保持架采用外引导方式时保持架质心运动较为稳定; 在内外圈同向旋转且外圈转速高于内圈转速条件下, 保持架采用外引导方式时, 保持架打滑率较低; 在内外圈反向旋转且外圈转速高于内圈转速条件下, 保持架质心轨迹变得不规则; 保持架采用外引导方式时, 保持架打滑率为负值.

英文摘要:

Dynamic differential equation of a high-speed cylindrical roller bearing was established. Fine integral method and predict-correct Adams-Bashforth-Moulton multi-step method were used to solve the dynamic differential equations of high-speed cylindrical roller bearing. Then the dynamic characteristics of cage were analyzed and discussed. The result shows: it's unlikely to keep stable rotation of cage when the ratio of pocket clearance to guiding clearance becomes too large; when one of the rings is fixed, the other is working and the cage guided by the rotating ring has lower slip ratio; it is helpful for stable mass center motion of cage when the cage is guided by outer ring; when the bearing is co-rotating and its outer ring's speed is larger than its inner ring's speed, the cage is guided by outer ring, and the cage has lower slip ratio; when the bearing is counter-rotating and its inner ring's speed is smaller, mass center trajectory of cage becomes irregular; the value of cage slip ratio becomes negative when the cage is guided by outer ring.