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高速滚子轴承的动力学分析

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DYNAMIC ANALYSIS OF HIGH-SPEED ROLLER BEARINGS

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摘要 根据流体和弹流润滑理论,建立了滚子轴承各元件间的相互作用模型;并根据牛顿运动定律,建立了滚子轴承动力学模型,编制了相应的软件。可以计算各元件之间的载荷分布、油膜厚度,并能对滚子和保持架的打滑、滚子的歪斜和轴向窜动等运动特性进行动态模拟,从而为高速滚子轴承的设计计算和故障分析提供了一种新的有效工具。

关键词： 滚子轴承   润滑   动力学   模拟

Abstract： The general fatigue theory of rolling bearings is unable to consider the failure due to skidding and skewing of rolling elements, which often occurs in high-speed roller bearings, According to the hydrodynamic and EHD lubrication theory, this paper establishes the interacting model among rolling elements. The dynamic model of roller bearings is also established according to the second Newton law. By means of the software provided in this paper, it is possible to calculate the load distribution, oilfilm thickness and fatigue life of roller bearings, and to simulate dynamically the skidding of rollers and cage, the skewing and axial motion of rollers. Hence, a new effective tool of design and failure analysis is provided for high-speed roller bearings.

Keywords： roller bearings   lubrication   dynamics   simulation

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