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弹性支承下弧齿锥齿轮齿面接触特性的理论与实验研究

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THEORETICAL AND EXPERIMENTAL STUDY ON CONTACT CHARACTERISTICS OF SPIRAL BEVEL GEARS FOR AEROENGINES WITH ELASTIC SUPPORTS

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摘要

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摘要 航空发动机采用弹性支承后, 转子弹性变形会造成主传动弧齿锥齿轮相对位置的变化, 从而影响齿面接触性能。针对某型涡喷发动机转子系统, 分析求解了弹性支承下齿轮安装处的变形, 并将其等效地转化为齿轮副间的安装距偏差, 在此基础上, 完成了弧齿锥齿轮齿面接触特性分析。在转子系统模拟试验台上, 对发动机主传动锥齿轮接触性能进行了实验研究。分析与实验结果同时表明支承刚度对齿面接触区和传动误差皆有很大影响。

关键词: 弹性支承 弧齿锥齿轮 接触分析 接触实验

Abstract: In order to increase the working reliability of main transmission spiral bevel gears for aeroengines with elastic supports, a theoretical and experimental study was made on the contact characteristics of the gears. The elastic deformations of gear shafts caused by mass imbalances of rotor and gears meshing forces were acquired by analyzing the rotor vibration. The contact characteristic of spiral bevel gears was theoretically calculated using a tooth contact analysis (TCA) technique. A contrast experiment for the spiral bevel gears was carried out on a rotor test facility with elastic supports. The theoretical and experimental results show that there exist great effects of support stiffness on the contact pattern and the transmission error of spiral bevel gears.

Keywords: elastic support spiral bevel gears tooth contact analysis tooth contact experiments

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