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面齿轮副啮合性能预控方法及试验

Pre-control and experiment method of meshing performance for face gear drives

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中文关键词： 面齿轮 三维拓扑修形 磨齿 啮合性能 预控

英文关键词:face gear three-dimensional topology modification gear grinding meshing performance pre-control

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中文摘要：

为了提高面齿轮副的啮合性能，根据面齿轮的磨削加工过程和配对圆柱齿轮的三维拓扑修形原理，推导了面齿轮副的三维拓扑修形齿面方程，分析了5种修形因数对面齿轮副啮合性能的影响，提出了通过优化修形因数实现面齿轮副啮合性能的预控，通过试验验证了三维拓扑修形理论的正确性.研究结果表明：齿廓修形因数是主要的预控参变量，对接触区域沿齿高方向的宽度有明显影响.齿向修形抛物线因数影响接触区沿齿长方向宽度，两者取值的不同能显著影响接触迹线的倾斜程度和接触区域的形状和面积.通过齿面三维拓扑修形，能有效预控齿面的接触区域和传动误差，降低面齿轮副对安装误差的敏感性.

英文摘要：

To enhance the meshing performance of face gear drives, based on the generation process of grinding of face gear and three-dimensional topology modification theory of pinion, the expressions of tooth face equations of face gear drives were derived respectively. The influence of 5 modification coefficients on the meshing performance were analyzed, and theory for meshing performance pre-controlled was proposed, which can be realized by optimizing the modification coefficients. The three-dimensional topology modification theory presented was verified by the experimental results.The results show that: the modification coefficient of tooth profile is the major pre-control parameters which affect the width of contact area along the direction of tooth height obviously. The modification parabolic coefficient of tooth length affect the width of contact area along the direction of tooth length, and different values of these two parameters can significantly affects the tilt of contact line and the shape and the size of contact area.Contact area and transmission error can be pre-controlled effectively by three-dimensional topology modification theory of pinion and the sensitivity of the installation error of face gear drives can be reduced effectively.

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