2006年第1期 总第27期(卷) 文章来源：华南理工大学 汽车工程学院, 广东 广州 510641|South China University of Technology, Guangzhou 510641, Guangdong, China

基于机构刚度的六杆虚拟轴并联机床几何结构优化

无

摘要: 提高虚拟轴并联机床的机构刚度是改善加工精度进而对机床进行精确控制的关键因素。针对虚拟轴并联机床的机构几何参数的优化问题，建立了以刚度为基础的机床加工过程中机构刚度分析模型。这种模型考虑了加工过程中几何和载荷变化对机床整体刚度的影响，它可以计入机床的瞬时弹性特性。利用这种模型对不同几何参数的虚拟轴并联机床机构进行加工模拟，计算一系列加工路径中其刀具偏移，从而可以优化出具有最小刀具偏移量，亦即刀具端具有最大刚度时的机构几何参数，进而改善机床的加工精度。研究结果对于六杆虚拟轴并联机床的机构设计与参数确定提供了简洁有效的方法。

关键词: 机械制造工艺与设备； 机床； 虚拟轴； 并联机构； 几何； 刚度； 优化； 设计
中图分类号: TP242 2

参考文献:

［1］Gosselin C, Angles J. The optimum kinematic design of a spherical three degree of freedom parallel manipulator［J］. J Mech Tran Automat Design, 1989,111(2): 202-207.
［2］Bhattacharaya S, Hatwal H, Ghosh A. On the optimum design stewart platform type parallel manipulators［J］. Robotica, 1995, 13: 113-140.
［3］Merlet J P. Designing a parallel manipulator for a specific workspace［J］. The International Journal of Robotics Research, 1997, 16(4): 545-556.
［4］Merlet J P. DEMOCRAT: A design methodology for the conception of robots with parallel architecture［J］. Robotica, 1997, 15: 367-373.
［5］Sanger D J, Chen J Q, Zhang S J, Howard D. A general method for the stiffness analysis of manipulator mechanisms［J］. Proc Instn Mech Engns, 2000, 214(Part C): 673-685.
［6］陈吉清，陈秉聪，宁素俭，等. 虚拟轴加工中心及其刚度分析方法［J］. 吉林工业大学学报, 1998, 28(4): 37-43.
CHEN Ji qing, CHEN Bing cong, NING Su jian, et al. Virtual axis hexapod machining centers and the method for stiffness analysis［J］. Journal of Jilin University of Technology, 1998,28(4):37-43. (in Chinese)
［7］Ei Khasawneh B S, Ferreira P M. Computation of stiffness and stiffness bounds for parallel link manipulators［J］.International Journal of Machine Tool & Manufacturer, 1999, 39: 321-342.

Stiffness oriented Optimization Methodology for Geometric Design of Virtual axis Hexapod Machine

CHEN Ji qing， LAN Feng chong

South China University of Technology, Guangzhou 510641, Guangdong, China

Abstract: Increasing the mechanism stiffness of the virtual axis hexapod machine is an important factor to improve machining and controlling precision. A geometric optimization method for the parallel machine was presented. The mechanism stiffness model was established and the instantaneous elastic characteristics were analyzed by the model during machining process in consideration of the effect of the changes in mechanism geometric and loading conditions on the total stiffness. Machining process simulations were carried out under a variety of constraint conditions. The cutter deviations from tooling paths were calculated, and the optimal geometric parameters for the mechanism with the maximum rigidity on the cutter end were obtained, so that positioning and machining accuracy could be improved. As a result, this research provides a simple and effective geometric methodology for mechanism design and geometric parameter determination for the virtual axis hexapod machine.

Key Words: manufacturing process and equipment; machine tool; virtual axis; parallel mechanism; geometry;

- 上篇文章：高强化发动机活塞冷却方式仿真
- 下篇文章：目标激光散射特性在钢板表面微观轮廓

□- 本周热门文章 □- 相关文章 无

1.目标激光散射特性在钢板表面微观轮廓<...[]