航空学报 » 2009, Vol. 30 » Issue (4) :768-772 DOI:

可重构混联机械手——Tricept的自标定方法

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Self-calibration of Reconfigurable Hybrid Robot—Tricept

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摘要 由于并联构型装备难于实现全闭环反馈控制，使运动学标定成为一项具有显著经济价值并十分有效的提高并联构型装备精度的手段，通常包括误差建模、测量、辨识和补偿4个环节。基于以上因素，以5自由度混联机械手Tricept为对象，研究一种基于内部传感器检测信息的运动学标定方法。首先建立传感器测量值与影响末端可补偿位姿误差的几何误差源的映射关系。在此基础上，讨论了几何误差的可辨识性。通过计算机仿真验证了所提方法的可行性和有效性。

关键词： 并联机构 自标定 误差建模 参数辨识 计算机仿真

Abstract： As it is difficult to realize full closed-loop feedback control for parallel kinematic machines (PKM), their kinematic calibration becomes one effective means of significant economic value to enhance PKM precision. In general, kinematic calibration consists of four steps, i.e. error modeling, measurement, identification, and compensation. By taking a 5 degree of freedom (DOF) reconfigurable hybrid robot named Tricept as an object of study, this article presents a kinematic calibration method based on joint sensors. The first order error function is formulated, which maps the measured data and the geometric source errors affecting the compensable pose errors. Based on the error mapping function, the identifiability of geometric parameters of Tricept is investigated. The validity and effectiveness of the proposed approach is verified by computer simulation.

Keywords： parallel kinematic machines self-calibration error model parameter identification computer simulation

Received 2008-07-03; published 2009-04-25

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引用本文:

洪振宇. 可重构混联机械手——Tricept的自标定方法[J]. 航空学报, 2009, 30(4): 768-772.

Hong Zhenyu. Self-calibration of Reconfigurable Hybrid Robot—Tricept[J]. Acta Aeronautica et Astronautica Sinica, 2009, 30(4): 768-772.