喷涂机器人空间轨迹到关节轨迹的转换方法　Conversion Method from Cartesian Space Trajectory to Joint Trajectory of Spray Painting Robot

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关键词：　喷涂机器人 空间轨迹 关节轨迹 Dijkstra算法

摘　要：　根据喷涂机器人离线编程需要和喷涂空间轨迹的特点，提出一种基于Dijkstra算法的喷涂机器人笛卡尔空间轨迹到关节轨迹的转换方法。通过分析工件坐标系和机器人基坐标系的关系，采用辅助特征点三点标定法将工件坐标系内的喷涂空间轨迹转换到机器人坐标系。建立了在机器人逆解中求取最短关节运动行程的优选模型，用赋权有向图表示所有机器人逆解间的行程关系，利用Dijkstra算法求最优的逆解组合。喷涂试验显示，所提出的轨迹转换方法能有效克服轨迹转换失真，验证了该方法的可行性和有效性。　A conversion method from cartesian space trajectory to joint trajectory of spray painting robot based on Dijkstra algorithm was presented to meet the requirements of offline programming spray painting robot and characteristics of spray cartesian space trajectory. Through analyzing the relations between the part coordinates and the robot basal coordinates, the spray cartesian space trajectory was converted to the robot basal coordinates by three points calibration of auxiliary feature points. An optimized model was established to obtain the shortest joint motion distance in robot inverse kinematics solutions. The distance between all of the inverse kinematics solutions was described by a directed weighted graph, and the Dijkstra algorithm was employed to obtain the optimal combination of inverse kinematics solution. Finally, the feasibility and efficiency of the method were verified by spray experiment.

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