

软件、算法与仿真

基于全景视觉的旋翼共锥度测量方法

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摘要:

在深入分析中心折反射全景相机成像原理的基础上, 提出了一种测量旋翼共锥度的新方法。用安装在直升机【HJ1.8mm】桨毂上与旋翼同步旋转的折反射全景相机获取直升机3片桨叶的全景图像。根据桨叶上标定块角点坐标与全景图像坐标对应关系, 给出了标定块相对于全景相机的外参数计算方法, 推导了一组根据平面标定块位置参数计算旋翼共锥度的公式。全景相机在直升机桨毂上的安装无特殊要求, 通过变换标定块位置, 可实现旋翼任意位置的共锥度计算, 与以前测量方法相比具有很大的灵活性。实验结果表明, 此方法误差在 ± 5 mm 以内。

关键词: 旋翼共锥度 全景视觉 全景相机标定 统一成像模型

Measurement method for helicopter blade pyramid angle based on panoramic vision

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Abstract:

According to the investigation of the imaging model for central omnidirectional cameras, a new measurement method for rotor pyramid angle is proposed. The omnidirectional camera installed on the hub of helicopter rotates with the rotor to take the picture of the planar grids pasting on the rotor blade. According to the grid corners coordinates and their associated image values, a method for calculating the planar grid's extrinsic parameters is given, and a group of equations are also given to calculate the helicopter blade pyramid angle. There is no special requirements for the installing of the omnidirectional camera on the hub of helicopter. By changing the position of the planar grids, the pyramid angle on arbitrary position of the rotor blade can be calculated. So it is a flexibility approach compared with existing measuring methods. Experimental results show that the error of this method is within ± 5 mm.

Keywords: helicopter blade pyramid angle panoramic vision omnidirectional camera calibration unified projection model

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