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论文

利用预失真条纹校正PMP系统投影仪畸变的研究*

陈文鑫[1],曹学佳[1],李勇[2]

（1 浙江万里学院 电子信息学院 浙江 宁波 315100）
(2 浙江师范大学 信息光学研究所 浙江 金华 321004）

摘要：

依据摄像机畸变模型提出了一种投影条纹相位畸变校正方法来简化相位-高度映射关系.该方法首先通过投两套互相垂直的相移正弦条纹,以相位值代替投影仪像素坐标,将投影仪当成摄像机看待,标定出投影仪的内参量.然后根据标定出的投影仪镜头畸变参量对理想相位施加反向的畸变,在投影时反向畸变的光栅通过镜头畸变,又成为理想的光栅,从而简化了相位-高度映射关系.实验中,虽然由于测量误差的影响,校正后的投影仪径向畸变系数还是比原来小了1个数量级.

关键词： 相位测量轮廓术 相位-高度映射 光栅投影 畸变校正

Study of Correcting distortion of projector in PMP by Predistortion Frings

CHEN Wen-xin[1],CAO Xue-jia[1],LI Yong[2]

(1 Faculty of Electronic and Information Engineering,Zhejiang Wanli University,Ningbo Zhejiang 315100,China)
(2 Institute of information optics,Zhejiang Normal University,Jinhua Zhejiang 321004,China)

Abstract:

According to the camera distortion model,a method with which lens distortion was corrected through phase pre-distortion of projected fringe pattern is introduced to simplify phase-height mapping.In this method,two suits of sinusoidal gratings which are perpendicular to each other are projected to the calibration target respectively.The projector was looked as a camera worked in reverse.Distortion coefficients of projector were estimated from the phase of target marks and their positions,according to the camera model.The reverse distortion of phase distribution in projector plane was acquired according to the camera distortion model.Then the phase-shifting sinusoidal fringes with pre-distorted phase are generated.The anamorphic sinusoidal fringes were distorted inversely during projecting because projecting process was the reverse process of imaging.Therefore,the ideal sinusoidal fringes are projected.The phase-height mapping of PMP system can be ideally expressed and the mapping procedure is simplified.In experiment,the coefficient of radial distortion was one order of magnitude smaller after correcting,even though the result is affected by measurement error.

Keywords: Phase measurement profilometry (PMP) Phase-height mapping Fringe projection distortion correcting

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作者简介:

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