

Application of Computer Vision and Laser Interferometer to the Inspection of Line Scale

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Abstract

In the paper machine vision, laser interferometer and coordinate measuring machine (CMM) are combined to develop a vision inspection system. The measurement capability of the developed system is investigated by measuring the distances between the lines on a standard line scale. The vision camera is used to replace the probe of the CMM to take the images of the interested lines on a line scale at two different positions. Meanwhile, the displacement of the CCD camera is measured using laser interferometer. Using subpixel edge localization and outlier-excluding least-squares regression, the distance between two interested lines is computed under an image plane coordinate system. By adding the displacement of the CCD camera measured using laser interferometer, the line space can be determined. Experiments have been performed repeatedly to measure the line space on the 1.00 mm and 300.0 mm line scales. Results indicate that the measured data only have a little fluctuation and are close to those obtained by the NML (National Measurement Laboratory, Taiwan).

Keyword : Vision inspection, laser interferometer, outlier-excluding least-squares regression, subpixel edge localization, line-space measurement