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基于ICT图像的航空发动机涡轮叶片壁厚尺寸精密测量方法

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Wall Thickness Precision Measurement Method for Air Engine Turbine Blade Based on ICT Images

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摘要 为保障航空发动机的可靠性,要求精确测量发动机叶片不同界面处的内、外表面法线方向的厚度。为此,研究了一种基于ICT图像的叶片壁厚尺寸亚像素级精密测量方法。它采用边界提取技术确定叶片内、外表面法线的方向;应用亚像素级边界定位技术,在该法线方向,定位壁厚的起始边界点和终止边界点;然后,计算两个边界点坐标位置差,获得以像素为单位的壁厚尺寸;最后,对像素尺寸进行标定,获得以毫米为单位的壁厚尺寸。试验结果表明,本文方法实际测量精度达到0.2个像素和0.042 mm。

关键词: 图像处理 壁厚测量方法 矩匹配 涡轮叶片 ICT图像

Abstract: Precision measurement of blade wall thickness along the common normal of inner and exterior surfaces is required to guarantee the reliability of air engine. A blade wall thickness precision measurement method based on ICT image with sub-pixel accuracy is researched to satisfy this requirement. This method adopts edge extraction technology to find the common normal of inner and exterior surfaces and edge location technology to get the start and end points of wall thickness along the normal. Then the wall thickness with unit pixel is available by calculating the distance between the start point and the end point. Finally the wall thickness with unit millimeter is created by unifying pixel size. The experiment result demonstrates that the practical accuracy of this method reaches 0.2 pixel and 0.042 mm.

Keywords: image processing wall thickness measurement method moment match turbine blade ICT image

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