计算机工程与应用 2010 46 (2): 203-205 ISSN: 1002-8331 CN: 11-2127/TP

工程与应用

工业CT材料密度测量方法研究

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收稿日期 2009-3-27 修回日期 2009-5-25 网络版发布日期 2010-1-20 接受日期

摘要 为了实现对密度高且变化范围大的材料进行密度定量测量，建立自动密度测量系统，对工业材料的密度与CT数的关系进行研究。根据工业CT检测工件常见密度，选取有代表性的几种均匀材料作为标件，并以铝材料作为参考标准件。通过CT扫描获取不同密度标件对应的CT数。选用一幅CT图像为标定图像，以该图像中空气的CT数为标准，对被测材料的CT数进行修正。采用最小二乘法拟合材料密度与CT数的关系式。实验对塑料、橡胶、玻璃、钛合金、钢、铜等材料的密度进行测试，测量精度小于1%。测量结果基本满足工业材料密度的精度要求。

关键词 CT图像 材料密度 CT数

分类号 TP391

Research on measuring ICT material density

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Abstract

In order to realize density quantitative measurement for high-density and great varying range materials，an automatic density measurement system is established and the relationship between the density and CT number of industrial materials is investigated.According to the common density of detected work-piece in ICT，a few representative kinds of uniform material are chosen as the standard work-pieces and aluminum material is as a standard reference.It is based on CT scanning to gain the CT number with different density standard work-pieces.The CT number of air in the standard image，chosen from all，is as the reference standards for correcting the CT number of detected material.Using the least square method fits the formula between the material density and the CT number.An experiment to detect the density of plastics，rubber，glass，titanium alloy，steel and copper，the measuring accuracy can be reached 1%.It can satisfy the industry requirements of precision.

Key words CT image material density CT number

DOI: 10.3778/j.issn.1002-8331.2010.02.060

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