

论文

基于统计特征的钢丝绳芯输送带故障自动检测

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摘要:

根据钢丝绳芯输送带X光图像呈规律性变化的特点, 提出一种基于统计特征的自动检测故障的方法。对输入图像进行归一化和规范化后, 逐行扫描、计算每个像素点的MRB (Modified Regular Bands) 参数值, 与整幅图像的MRB参数值的均值相减, 再用差值和训练阶段得到的阈值比较, 判断出有无故障并从故障图像中检测出故障区域。通过对常见的4类故障的检测, 结果表明: 该方法检测准确性高、操作简单、运行速度快, 适于在线检测; 与均值和方差相比, MRB参数对故障更敏感, 能检测出细小的故障, 图像对比度高、能更好地凸显出故障区域, 且检测出的故障区域更接近于故障的外形。

关键词: 钢丝绳芯输送带; 故障检测; 统计特征; MRB

Automatic fault detection for steel cord conveyor belt based on statistical features

Abstract:

The X-ray images of steel cord conveyor belt are built on a repetitive unit of a pattern. Based on the statistical features and the idea of regularity, a fault automatic detection method named MRB (Modified Regular Bands) was proposed to monitor the status of steel cord conveyor belt. Firstly, the input image of steel cord conveyor belt was normalized and standardized. Then the MRB parameters of each pixel were calculated by the progressive scanning. Finally, after subtracting the MRB parameter mean of the whole image, the detected result whether it is a fault image or not was obtained and the fault region was extracted from the fault image, by the way of comparing with the thresholds obtained from training stage. The results of the detection of four kinds of typical steel cord conveyor belt faults show that the MRB method has higher precision, is simple and fast enough for real-time on-loom fault detection. Compared with the statistical method such as the mean and variance, the MRB method is sensitive to the faults and can detect the small faults. The image of MRB parameter has higher contrast, so it can stand out the fault region from the fault-free region. And the shape of fault region is well acquired by MRB method.

Keywords: steel cord conveyor belt; fault detection; statistical features; MRB

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