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光学精密工程 2012, 20(11) 2459-2464 ISSN: 1004-924X CN: 22-1198/TH

微纳技术与精密机械

基于非负矩阵分解算法的工程陶瓷磨削表面损伤检测

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摘要： 考虑表面损伤检测在工程陶瓷表面质量评价中的重要作用,首次把非负矩阵分解(NMF)图像重构算法引入工程陶瓷磨削表面损
并进行了理论分析与实例检测。首先,将输入图像数据集从原始数据空间降维到一个低维NMF空间,利用本文提出的图像重构相对误差(
则,确定子空间基*r*值。然后,利用两个低维非负矩阵进行图像重构,获取磨削纹理背景图像,并通过图像减法去除磨削纹理。最后,利用Ca
检测算法提取工程陶瓷磨削表面损伤图像。实验结果表明,该方法能够准确提取表面损伤并计算磨削损伤率评价参数。

关键词： 工程陶瓷 磨削纹理 表面检测 非负矩阵分解

Damage detection of engineering ceramics ground surface based on NMF

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Abstract: As the surface damage detection plays an important role in evaluating engineering ceramic surface q
this paper introduces an image reconstruction algorithm, Nonnegative Matrix Factorization (NMF) algorithm, int
damage detection of engineering ceramics grounding surface for the first time. It analyzes the theoretical funct
the algorithm and gives a detection example. First, the input image data set was reduced from an original data
to a lower-dimensional NMF space, and the image reconstruction relative error 0.1 rule proposed by this paper
used to determine a proper space basis *r* value. Then, the background image of ground texture was obtained
image reconstruction using two lower-dimensional nonnegative matrixes, and the ground textures were remov
image subtraction. Finally, the Canny edge detection was used to extract the damage image of engineering ce
grounding surface. Experimental results indicate that the proposed method can accurately extract the surface
of engineering ceramics and can calculate the evaluation parameter of grinding damage rate.

Keywords: engineering ceramics ground texture surface inspection Nonnegative Matrix Factorization(NMF)

收稿日期 2012-06-03 修回日期 2012-08-30 网络版发布日期

基金项目:

国家自然科学基金资助项目(No. 51075296);国家科技重大专项资助项目(No.2011ZX04002-161)

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