

工程与应用

## 基于机器视觉的珍珠图像采集及缺陷检测

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**摘要** 针对珍珠表面图像采集和缺陷检测中存在的特殊问题, 采用穹顶形散射光源以减小珍珠的光斑效应并提高图像质量, 设计了珍珠自由落体状态下准同步方式的多幅图像获取方案, 提出了用基于距离变换的自适应非线性滤波器来增强缺陷区域的对比度, 对增强后的图像通过区域生长提取可疑缺陷区域, 在光斑及光晕的空间分布模型上利用形态学方法去除了光斑-光晕区域, 最后提取出缺陷的纹理特征、几何形状等特征参数。实验表明, 该方案和算法能有效地实现珍珠表面缺陷检测。

**关键词** [珍珠](#) [图像获取](#) [缺陷检测](#); [自由落体](#) [对比度增强](#) [区域生长](#) [形态学](#)

分类号

## Machine vision based image grabbing and defect detection of pearl surfaces

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### Abstract

To overcome the special problems in images grabbing and defects detection of pearl, a dome-shaped light source with diffused light illumination is designed in this paper to improve image quality and reduce light-spot size. And a novel quasi-synchronous multi-images grabbing scheme from different views is proposed based on pearl's free falling motion. A new nonlinear filter based on space geometry was designed to enhance defect contrast and region-grow method is then used for extracting all suspicious defects, including highlight-halation regions. Furthermore, the highlight-halation regions are removed using morphological method based on the special distributive model of the highlight-halation. At last, shape and texture features of defect regions are extracted to describe different defects. Experiments show that the acquired images included the complete information of pearl surfaces and extracted features could effectively implement the defect detection of pearl surfaces.

**Key words** [pearl](#) [image acquiring](#) [defect detection](#) [free falling](#) [contrast enhancement](#) [region grow](#) [morphology](#)

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