

光通信与光信息技术

基于光纤振动的激光散斑控制

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摘要: 散斑噪声的存在使得图像灰度剧烈变化, 降低了图像分辨率, 影响成像质量。为了控制散斑噪声, 使用波长为405nm的激光作为显微系统照明光源, 利用音圈电机振动光纤, 通过对抛光玻璃显微成像, 用CCD图像采集卡采集图像后进行了散斑噪声对比度分析。结果表明, 在光纤振动幅度不变、振动频率在4Hz~55Hz内逐渐增加时, 图像散斑对比度在0.0326~0.1197范围内逐渐变小; 当频率大于51Hz时, 图像散斑对比度曲线趋于平稳且对比度在0.0326处获得了最小值, 图像清晰, 达到良好的散斑控制。

关键词: 激光光学 激光散斑 散斑对比度 频率

Laser speckle control based on optical fiber vibration

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Abstract: The image gray can be changed by severely the speckle noise, so the image resolution can be reduced and the image quality was decreased. In order to control the speckle noise, using a laser at 405nm wavelength as light source of the microscopic imaging system and a voice coil motor vibrating the optical fiber, images was obtained by the polished lens and captured with a CCD image acquisition card, the speckle noise contrasts were studied. The results show that when the fiber vibration amplitude is stable and the vibration frequency is increased from 4Hz to 55Hz, the image speckle contrasts change in the range of 0.0326~0.1197 and the overall trend gradually becomes smaller. The image speckle contrast levels off when the frequency is more than 51Hz. When the speckle contrast reaches the minimum at 0.0326, the image is clear and the laser imaging speckle can be controlled satisfactorily.

Keywords: laser optics laser speckle speckle contrast frequency

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