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光电信息获取与处理

粒子场数字全息诊断中的再现算法研究

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摘要：

粒子场的数字全息诊断中，良好的再现算法能够在较短的时间内给出高质量的再现像。利用标准粒子板模拟单层面的粒子场，使用大面阵CCD实现同轴数字全息记录，得到了大尺寸的数字全息图。针对4种数字全息再现算法，本文从再现图像的质量、再现全息图的大小和计算速度3个主要方面进行了比较研究，结果表明角谱算法(FFT-AS)具有再现图像背景均匀，再现结果中无物理图像压缩，可以再现大尺寸的全息图且具有较快计算速度的优点，适合于粒子场同轴数字全息图的再现计算。

关键词： 数字全息　衍射计算　再现算法　粒子场

Reconstruction algorithm of particle fields digital holographic diagnosis

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Abstract:

High quality reconstruction image of particle fields digital holographic diagnosis can be obtained quickly by high performance reconstruction algorithm. The in-line digital holographic experiment of standard particle plate was designed with a large format CCD, and the large size digital hologram was obtained. The performances of the four reconstruction algorithms, such as the quality of the reconstructed image, the hologram size which can be reconstructed, calculation speed, were studied and compared. The results show that FFT-AS algorithm makes reconstruction image background uniform, without reconstruction image compression, has faster calculation speed and the ability of reconstructing large size holograms, so it is suitable to reconstruct particle fields of in-line digital hologram.

Keywords: digital holography　diffraction calculation　reconstruction algorithm　particle fields

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