

光学计量与测试

Wollaston棱镜阵列中子棱镜结构角误差分析

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摘要:

Wollaston棱镜阵列中各个子棱镜的结构角间的误差影响着光谱仪的性能。从干涉图的无缝拼接入手, 推导了n元Wollaston棱镜阵列的最大光程差公式, 以三元Wollaston棱镜阵列为例, 分析子棱镜结构角误差对光谱分辨率的影响, 通过干涉条纹光强公式构建干涉图样模型, 利用Matlab软件编写相关程序, 仿真了630nm单色光的复原光谱, 分析结构角误差对光谱的影响。实验结果表明: 当子棱镜结构角误差大于10⁻³数量级时, 光谱中将有伪峰出现, 为Wollaston棱镜阵列的研制提供了理论依据。

关键词: 傅里叶变换光谱仪 Wollaston棱镜阵列 空间调制 干涉图拼接

ATolerance analysis of wedge angle in Wollaston prism array

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Abstract:

The performance of polarization interference Fourier transform spectrometer is dependent on the angle error of each prism in Wollaston prism array(WPA). Based on the seamless stitching of interferograms, the maximum optical path difference of 1×n WPA was deduced. Taking a 1×3 WPA as example, the impact of the angle error of each prism on spectral resolution was analyzed. The interferogram model was constructed based on fringe pattern intensity formula. The spectrum of 630nm monochromatic light was simulated with MATLAB program and the impact of angle error on spectrum was analyzed. A false spectral peak occurred when the angle error was larger than the magnitude of 10⁻³.

Keywords: Fourier transform spectrometer Wollaston prism array spatial modulation stitching of interferograms

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